The Space Between:

Using Inquiry Teams to Encourage Multilevel Boundary Crossing Between Educational Research and Practice

by
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Abstract

Scholars have explored a gap between education research and practice that has been sustained on many levels. Current models for improving knowledge sharing between the two entities often fail to encourage boundary crossing on an institutional, interpersonal, and intrapersonal level. A new model, Inquiry Teams, was proposed and implemented in the context of a small independent elementary school. To encourage multilevel boundary crossing, the Inquiry Team intervention was comprised of three elements: a knowledge broker, community of practice, and collaborative inquiry. Findings from the mixed methods study of this Inquiry Team experience were analyzed using the lens of multilevel boundary crossing. Qualitative and quantitative results suggested changes at the institutional and interpersonal levels, and some indications of possible change at the intrapersonal level. The use of Inquiry Teams, the complexities of practitioners' use of research, and decision-making processes in schools are topics in need of further exploration to provide a better understanding of how knowledge is mobilized in the field.

Keywords: *multilevel boundary crossing, research, collaborative inquiry, knowledge broker, community of practice, knowledge mobilization*

Dissertation Advisor: Juliana Pare´-Blagoev

Dedication

This dissertation is dedicated to my entire family and close friends, whose support and continued encouragement sustained me through this amazingly difficult, rewarding, and transformational experience. To my grandmothers Bernice Asmonga and Jane Truxal, and to my mother Karen Hanno, for being wonderful models of strong, hard-working, intelligent, and independent women. To my father Daniel Asmonga, my brother Dalton Asmonga, and my brother-in law Daniel Hadley for always supporting me. To my sister Deanna Hadley, who is my best friend and most trusted advisor. Finally, to my nieces Cassidy Starr and Alaina Hadley, and nephew Joshua Hadley, all of whom I love dearly—I hope this shows you that anything is possible in life if you have an open heart, perseverance, and God guiding your way.

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Executive Summary

The Gap Between Educational Research and Practice

Scholars have described educational research and practice as operating largely independently of one another (Broekkamp & van Hout-Wolters, 2007; Vanderlinde & van Braak, 2010). The divide between education research and practice is often characterized as a gap, including specific research disciplines such as neuroscience (Breur, 1997; Bultitude, Rodari, & Weitkamp, 2012). This gap hinders the mobilization of knowledge between the two stakeholders, thus impeding educational decision-making, innovation, and the overall advancement of the field.

Factors Contributing to the Gap

The gap between educational research and practice is sustained on many levels. On an organizational level, disciplinary divisions at the university level and grade level and subject area distinctions in schools keep information siloed (Marks & Louis, 1999). Structures at the university level reinforce a focus on publishing, instead of fostering collaborations with practitioners (Ovenden-Hope & la Velle, 2015). Conversely, practitioners often do not have the time to read, knowledge to analyze, or resources to access research articles (Levin, Cooper, Arjomand, & Thompson, 2011). Within the education community, research knowledge is more valued than practitioner knowledge (Cain, 2015). Within schools, practitioner knowledge is not often sought after because decisions are often made by administrators (Tschannen-Moran, 2009). This illustrates how knowledge within schools and in the education field at large often remains fragmented, which influences the educational decisions of practitioners and scholars alike.

Individuals' beliefs and identities can also reinforce the gap between educational research and practice. Many researchers do not identify with the need to influence practitioner knowledge, but instead view their primary role as adding to the general knowledge base. Conversely, practitioners may not view research as being part of their identities as teachers. Beliefs are also salient, in that they can influence human perception (Pajares, 1992). Practitioner beliefs are based on their experiences and can influence their receptivity to new knowledge (Kagan, 1992; Kennedy, 1997). In addition, individuals may continue to hold onto beliefs based upon inaccurate knowledge, even after being presented with the scientifically correct information (Pajares, 1992). All factors from an organizational to a personal level must be considered when discussing how the gap between educational research and practice is sustained.

Sunnyville

Sunnyville is an elementary school that serves 230 students in grades PreK to 5. As an independent school, is not held to federal and state guidelines that focus on standards and standardized testing. Students take part in a balanced curriculum that includes specialty areas (i.e., art, music, physical education, Spanish, etc.) and content area subjects (i.e., reading, math, writing, science, etc.). The school is led by a head of school and a president of the larger organization. Many of the major curricular and policy decisions are made by the head of school without high levels of faculty input. The school has gone through many changes in the past 6 years under her leadership; as may be typical in schools, each suggested change has been met with varying levels of resistance from the faculty. These dynamic site-specific factors are among those that influence the decision-making practices of the faculty and the administration at Sunnyville.

The Boundary Perspective

Scholars have used the concept of boundaries, defined as a socio-cultural difference leading to discontinuity in action or interaction (Akkerman & Bakker, 2011), to describe the space between educational research and practice. A boundary describes a space that has the potential for interaction between researchers or practitioners and that with effort, communication, and collaboration can promote boundary crossing. Effort is required for many reasons, including that boundary crossing requires experts to interact with other domains outside of their expertise, which may cause feelings of vulnerability (Suchman, 1994). Akkerman and Bruining (2016) suggested that boundary crossing takes place on an institutional, interpersonal, and intrapersonal level.

Boundary crossing at the institutional level describes when multiple organizations or organizational units interact with one another. At Sunnyville, grade level and specialty area role divisions exist with few opportunities for those boundaries to be crossed. There are also boundaries between elementary, middle, and high school divisions. Boundary crossing at the interpersonal level focuses on the interaction of different groups, such as researchers and practitioners. Although Sunnyville is situated in a city with many universities, its teachers do not often collaborate with researchers, outside of professional development presentations that often place faculty as passive receivers of knowledge. The extent to which that information is applied by the faculty is unknown, and teachers often voice their frustrations if information presented is not practical. Intrapersonal level boundary crossing describes the internal identity transformations or changes to participants' beliefs that arise in those who work at the boundary. Decision-making practices at Sunnyville are often influenced by teachers' beliefs. Truly fruitful boundary

crossing endeavors will address all of these levels, supporting the school's transformation into a space that cultivates collaboration.

Evidence of a Possible Boundary at Sunnyville

The faculty at Sunnyville completed a survey inquiring about the information sources they utilize to inform their instruction. Forty percent of the faculty members (*n*=15) voluntarily participated in the study. The majority of respondents mentioned utilizing the curriculum (9%), their colleagues (9%), books (9%), websites (10%), professional development provided by the school (10%), and professional development opportunities outside of the school (10%) as primary sources of information (see Chapter 2). Researchers primarily use academic journals to disseminate research findings to practitioners (Abodeeb-Gentile, Pedro, & Tapper, 2016). The needs assessment revealed academic journals to be the least utilized source amongst the faculty to inform educational practice (4%). These findings illustrate a possible divide between teachers' use of primary research and practice; however, the findings do not suggest that the other sources that are most utilized by practitioners are not embedded with research based information, instead it displays that they do not often reference academic journals when making educational decisions. Interviews with the head of school and some faculty members reinforced that educational decisions are often based on word of mouth, experience, and personal beliefs.

Inquiry Teams as a Possible Intervention

The Inquiry Team is a combination of three interventions suggested by the literature: knowledge broker, community of practice, and collaborative inquiry. A knowledge broker is a third-party organization or individual that provides structures and support to bridge the gap between research and policy or practice (Bultitude et al., 2012).

Communities of practice describe "groups of people who share a concern or passion for something they do and learn how to do it better as they interact regularly" (Wenger, 2011, p. 1). Collaborative inquiry is a process practitioners engage in to identify common challenges, analyze relevant data, and test out instructional approaches (David, 2008). In this study, the researcher expands the collaborative inquiry cycle suggested in this study based on previous frameworks to include a focus on having practitioners consult research knowledge, and combining that with knowledge from the context and their own experiences to inform their decision-making. The collaborative inquiry cycle includes the following stages: framing the problem, gathering practitioner knowledge, gathering information from research, gathering data from context, analyzing input from all resources, developing strategies, applying strategies in context, analyzing evidence, and sharing the findings. All three of the Inquiry Team components are necessary to encourage multilevel boundary crossing, as Akkerman and Bruining (2016) described. Through this intervention, the researcher aimed to address the following research questions:

RQ1: How was knowledge discovered, generated, and disseminated by the Inquiry Team?

RQ2: Did the work the Inquiry Team participants engaged in have any impact on their practice?

RQ3: What is the role and some characteristics of a knowledge broker in educational settings?

RQ4: Did the Inquiry Team intervention create opportunities for multilevel boundary crossing amongst its participants, and between educational research and practice?

RQ5: What aspects of the Inquiry Team experience supported or inhibited knowledge mobilization?

The Implementation of the Intervention

In the study, the student investigator assumed the role of knowledge broker as she had the knowledge to be able to cross the boundary between educational research and practice. In November, the knowledge broker presented about the Inquiry Team and possible topics of inquiry as provided by the faculty the previous year. The entire Sunnyville faculty then voted to have the Inquiry Team investigate the topic of reporting student progress. At the first Inquiry Team meeting, the participants decided to further narrow their investigation to the topic of report cards.

The Inquiry Team met at Sunnyville for eight sessions, each averaging about 1 hour and 15 minutes in length, between the months of January and June. They moved through most aspects of the collaborative inquiry process with help from the knowledge broker except for analyzing evidence from the application of the new strategy. The knowledge broker facilitated the Inquiry Team meetings and provided supports to ensure practitioners develop the skills needed to read, analyze, and access research to inform their decision-making. The researcher analyzed the experience of Inquiry Team participants using data from a questionnaire about the use of research based information (QURBI; Lysenko, Abrami, Bernard, & Dagenias, 2014), semi-structured interviews, artifact analysis, knowledge broker journal reflections, and video recordings of the team meetings.

Data Collection and Analysis

The researcher utilized a convergent mixed methods study design to provide information about the Inquiry Team experience. Data collection occurred prior to the intervention to gather information about current research use and decision-making practices. The researcher collected qualitative data through semi-structured interviews, and participants also completed the questionnaire about the use of research-based information to gather quantitative data. Four non-Inquiry Team participants also completed the survey, and the researcher interviewed two of these participants to gather information about current organizational practices. The head of school was also interviewed to provide insight into her decision-making experiences and organizational norms. Data were gathered during the intervention through Inquiry Team meeting video recordings, the knowledge broker's journal, artifacts, and activity logs completed by both the participants and the knowledge broker. The researcher used the data collected during the intervention to craft the post intervention QURBI semi-structured interview questions. Participants and non-Inquiry Team participants were given the QURBI with some additional questions that were individualized for each group. Three members of the Inquiry Team were also interviewed. Finally, at the conclusion of the intervention, the Inquiry Team members were asked questions about the experience and the knowledge broker to complete without the knowledge broker being present.

The researcher analyzed the quantitative and qualitative data separately and then compared them to identify convergent and divergent themes. The qualitative data were coded and an interpretative phenomenological analysis was conducted (Pietkiewicz & Smith, 2012) to aid the investigator in deepening her thinking about the participants experiences. The researcher analyzed quantitative data using descriptive statistics.

Findings

Findings indicated that the Inquiry Team participants found the overall experience to be of value. A majority of the participants reported expanded knowledge of accessing, reading, and analyzing research. In addition, the Inquiry Team model provided opportunities for participants to collaborate across grade levels and altered the organizational hierarchy which enabled them to have more of a voice in decision-making processes in regards to the report card format.

The participants worked together to gather information from the context, their experiences, and the research community. Accessing and applying knowledge from the research community proved to be difficult for some. The participants had to rely on information from the context and their own experiences to fill the holes where previous research literature could not provide information. Improving the report card format at Sunnyville proved to be a process that required innovation, as none of the sources referenced could provide a clear path forward. The intervention concluded with the participants sharing their knowledge with a presentation to the faculty and administrators. The extent to which changes to the report card format will be made have yet to be realized, as work will continue in the following school year.

The researcher also provided information about the components of the intervention. The researcher garnered much information about the role of the knowledge broker. The knowledge broker spent much time planning for Inquiry Team meetings, engaging in Inquiry Team activities, participating in online communication, and meeting with the head of school. The knowledge broker had many challenges, such as knowing exactly which research-based activities to engage the participants in, achieving all of the goals in the time allotted, supporting participants individually, and navigating complex

political situations. The knowledge broker's knowledge of the context, educational research landscape, and ability to foster collaboration proved to be salient characteristics. The collaborative inquiry process was also an important component as it guided the work of the team. The selected problem was the focus throughout the investigation and was not moved beyond as the model suggests. In addition, collecting data was not as linear as the model presented, and data were often simultaneously collected from many sources.

The Inquiry Team intervention promoted multilevel boundary crossing. Boundary crossing occurred at the organizational level at Sunnyville and also between educational research and practice. The meeting times provided a structural change that enabled knowledge mobilization at an institutional level. Collaboration fostered interactions and perspective taking at the interpersonal level. The interactions among the participants deepened their understanding of research and the complexities of the problem through learning the experiences of their peers. Changes to participants' identity formation, sense of empowerment, and belief systems were explored as boundary crossing occurred at the intrapersonal level. Although there is still much to investigate in regards to finding ways of promoting boundary crossing, the Inquiry Team intervention presents as a potential framework for encouraging improved decision-making and innovation in schools.

Chapter 1: The Boundary Between Educational Research and Practice

Schools are organizational environments that provide an atmosphere of continued change, while longstanding organizational structures endure (Tyack & Cuban, 1995). An environment of perpetual decision-making prevails influencing the type and extent of changes that will or will not occur. The sources from which information is gathered and the processes used to arrive at educational decisions should be studied because their potential to impact the school environment may be significant.

Sunnyville is an independent PreK through fifth grade elementary school located near a major city in the northeast United States. The school has gone through many curricular and philosophical changes over the past 7 years under the direction of a new head of school, which has had varying degrees of faculty support, fidelity of curriculum implementation, and positive outcomes. All of the decisions about the direction of the school are made by the head of school with differing levels of input from the faculty. The head of school reports to the president of Sunnyville; however, the president does not participate in specific programmatic decisions at the elementary level. As such, the direction of the school is largely forged by the experiences and knowledge of the head of school. When observing how educational decisions were made in this context, it was apparent that—as is common within the U.S. as a whole—at this site, research was not often referenced or a major source of information used to guide decisions.

Indeed, researchers have often described educational research and practice as two entities that operate separately from one another. Broekkamp and van Hout-Wolters (2007) found that researchers and practitioners recognize the divide between educational research and practice. These authors described, however, that the emphasis on bridging the divide has heighted in recent years due to educational policies that have called for the

adoption of research-based decision-making practices. Vanderlinde and van Braak (2010) conducted focus group interviews with teachers, school leaders, and intermediaries, who all acknowledged that a gap between educational practice and research exists.

At Sunnyville, it is possible to observe this gap in how research is not discussed, read, or referenced when educational decisions are made—whether by the head of school or the faculty. Furthermore, educational researchers are not typically present in the building unless they are commissioned to lead a professional development opportunity. In addition, the current organizational structures at Sunnyville promote knowledge fragmentation, encourage unilateral decision-making, and do not have a process for gathering information before decisions are made. These factors diminish the organization's ability to make decisions informed by a range of input, rather than being primarily driven by the knowledge held by the school's current personnel. By bridging the divide between educational research and practice, and developing organizational structures that promote knowledge-sharing, it may be possible to improve the ability of educators at Sunnyville to find innovative solutions to the complex problems that they face.

The Boundary: A Conceptual Framework

There are many divisions within Sunnyville that impact knowledge-sharing and decision-making. By conceptualizing these divisions as boundaries, the current researcher provided a framework for analyzing the complexities that exist in understanding the fragmented organization of knowledge at the school. The use of the physical concept of boundaries as a metaphor materialized as scholars began to expand upon the ideas of expertise. Learning theorists have characterized expertise as the mastery of knowledge in a specific field or domain (Egeström, Engeström, & Karkkainen, 1995). This

characterization of expertise, however, has not accounted for the learning that can occur as experts interact with multiple contexts outside of their domain to gather information to create hybrid solutions (Egestrom et al., 1995). The concept of boundaries was used in an effort to explain the space between domain specific communities of practice; therefore, boundaries are defined as a socio-cultural difference leading to discontinuity in action or interaction (Akkerman & Bakker, 2011). Edelenbosch, Kupper, Krabbendam, and Broerse (2015) leveraged the boundary framework to describe the relationship between science and educational practice. Boundary crossing is highly related to and essential for knowledge-sharing amongst researchers and practitioners.

Boundary crossing calls experts to interact with other domains outside of their expertise. Suchman (1994) explained that engaging in boundary crossing "means entering into a process of profound and uncomfortable social change" (p. 5). This author detailed the feelings of discomfort that can arise from the movement into new territory as this unfamiliarity can cause experts to feel unqualified. Suchman explained that he act of boundary crossing evokes both cognitive and emotional responses. Engeström et al. (1995) built upon the cognitive component by describing boundary crossing as a cognitive process of collective concept formation. As the experts interact with the inhabitants of other boundaries, they gather information that is not part of their expertise to extend their thinking. These authors explained that those who engage in boundary crossing have to overcome cognitive inertia and the gathering of information that only reinforces their own preconceived hypotheses. Boundary crossing requires mental flexibility on behalf of individuals, but intended effects of interacting across contexts are intended to alter both the individual and the larger social context (Akkerman & Bakker,

2011). Such efforts during boundary crossing can establish or reestablish previously absent actions and interactions, thereby transforming the space into a possible resource for learning (Akkerman & Baker, 2011). Researchers' collective exploration of the concept of boundary crossing has helped to expand scholarly characterization of the boundary to encompass an active space with its own language, objects, people, and work.

When considering interventions to improve the knowledge-sharing between educational researchers and practitioners, boundary crossing may occur at a number of levels. Akkerman and Bruining (2016) suggested that boundary crossing takes place on an institutional, interpersonal, and intrapersonal level. Boundary crossing at the institutional level can occur when multiple organizations or organizational units interact with one another. Interactions between schools and research organizations or changes to a school's organizational structure are examples of boundary crossing on the institutional level. Barriers to boundary crossing between or within an organization can inhibit or even prevent knowledge-sharing. Sunnyville is impacted by institutional barriers, including those that exist between research and practice, as well as the organization's own internal divisions.

Boundary crossing at the interpersonal level focuses on the interaction of different groups. Boundary crossing at this level can be observed in the interactions between practitioners and researchers from different contexts or in numerous subgroups of teachers or researchers interacting in their own context. Intrapersonal level boundary crossing describes the internal identity transformations that arise in those who participate in work at the boundary. Although changes to individual beliefs were not included in Akkerman and Bruining's (2016) description of changes at the intrapersonal level,

scholars have identified a person's beliefs as a factor in the adoption of new knowledge and can influence decision-making practices (Kagan, 1992; Kennedy, 1997; Pajares, 1992). Expanding the definition in this way describes the possible numerous changes at the intrapersonal level that can occur within the individual as they engage in boundary crossing activities. In the paragraphs that follow, the researcher will outline the factors described as contributing to the divide between educational research and practice in terms of multilevel boundary crossing. In addition, the researcher will examine the boundary between education research and practice, as well as the specific boundary between educational practice and neuroscience, which has been closely examined in previous research literature.

Factors Reinforcing the Boundaries Between Educational Research and Practice

The boundary is a complex space that is commonly identified for being devoid of interaction; however, it has also been characterized as a possible space where new collaborations can be sustained and new knowledge generated. Educational boundaries have been sustained at Sunnyville and in many instances throughout the general field due to a number of factors. The factors are organized using the institutional, interpersonal, and intrapersonal categories that comprise Akkerman and Bruining's (2016) multilevel boundary crossing framework. Some of the factors described in the literature are readily observed at Sunnyville, and others have yet to overtly manifest although that does not negate their possible presence.

Boundaries at the Institutional Level

There are many institutional factors that impede knowledge-sharing between schools and research organizations and how it is shared within those contexts. The current research infrastructure reinforces a boundary that retains knowledge produced by

education researchers in universities and practitioner knowledge in schools. In addition, boundaries exist within the research community and in schools that limits knowledge-sharing amongst specialists in each context. At the university level, disciplinary and departmental divisions may create discourse that is highly specialized (Frazzetto, 2011; Knox, 2016). That specialization within divisions create boundaries that make the collaboration and communication difficult amongst researchers. Minimal boundary crossing can lead to inconsistent results, a lack of synthesis among studies, or a failure to communicate practical information to practitioners (Broekkamp & van Hout-Wolters; Levin et al., 2011). Additionally, these structures and specialized language can make accessing information cumbersome for those outside of the research community. Books and academic journals are most often used to report research findings (Abodeeb-Gentile et al., 2016; Ovenden-Hope & la Velle, 2015); however, these formats meet the expectations of academic audiences, not practitioners.

Further, even when students and practicing teachers are receptive to using research in its current format, they may have limited time to read, discuss, and absorb research articles (Kennedy, 1997; Levin et al., 2011; Marks & Louis, 1999; Ovenden-Hope & la Velle, 2015). While there are many mechanisms for professional learning at Sunnyville, it is not part of the culture to read and analyze research articles. This is not unique to Sunnyville; reading primary research articles is counter cultural to the field in general, as research knowledge is primarily synthesized by a third party before disseminated to practitioners. This is most readily observed in teachers' difficulty accessing the articles in research journals (Levin et al., 2011). Kennedy (1997) asserted that attempts to address teachers' inaccessibility to research are illustrated in the creation

of the government-sponsored ERIC clearinghouse and the National Diffusion Network, but posited that this may not be enough. Even when teachers have more access to primary research, as outsiders, they may lack the knowledge to be able to access current research or assess its quality (Levin et al., 2011). Many of the problematic organizational boundaries within schools as described by the literature as being observed in schools, also pervade Sunnyville. Teachers' knowledge often remains siloed as they operate in fragmented structures that reinforce subject, grade level, and hierarchical boundaries that prevent knowledge-sharing (Marks & Louis, 1999). Despite attempts to make research more accessible to practitioners, the divide may continue to be reinforced by the other organizational factors found in schools.

Another factor influencing knowledge-sharing is an organizational structure where school leaders rely on a hierarchy of authority that ensures they are the primary decision-makers. Tschannen-Moran (2009) explained that this structure impedes communication; decisions are often made with incomplete information because teachers are not adequately consulted. In addition, school structures are often procedure-oriented and rule-based, which may reinforce a culture of compliance. Cochran-Smith and Lytle (1990) described that "[in] many school systems teachers have not been encouraged to work together on voluntary, self-initiated projects or speak out with authority about instructional, curricular, and policy issues" (p. 9). Such a bureaucratic orientation of school organization, which reinforces a culture of compliance through administrative decision-making, can impede organizational boundary crossing because engaging in collaborative activities that encourage teachers to share or generate knowledge is counter cultural. These phenomena that have been observed in other schools are also present at

Sunnyville. Administrators have implemented some recent structural changes to garner teacher input in decision-making; however, it is too early to know if this will be long-lasting or effective. The structures of both universities and schools also provide insight into the discrepancies that exist in how practitioner knowledge and research knowledge are valued.

The many boundaries that exist within educational organizations and between them must be addressed through structural changes that promote boundary crossing. Organizational structures that keep knowledge siloed, the format of how knowledge is communicated, and hierarchal leadership structures keep knowledge fragmented and thus impedes informed decision-making. Even if it is possible to overcome boundaries on an institutional level, this does not guarantee that sustained boundary crossing will occur unless interpersonal factors are also considered.

Boundaries at the Interpersonal Level

As previously described structures that encourage isolation inhibit interaction between practitioners and researchers. These same structures also reinforce a knowledge hierarchy that values research knowledge over practitioner knowledge. Cain (2015) described the misalignment between research- and practice-based knowledge, which contributes to practitioners' skepticism that educational research can be useful to them. This author described research knowledge as being narrowly focused, impersonal, and often generated to influence theory development. In contrast, practitioner knowledge is practical, tacit, and intimately connected to values. McIntyre (2005) built upon Cain's (2015) assertions to describe how practitioner knowledge is highly contextual and diverse. Teachers have knowledge about the content they teach, students' learning and thinking, and specific curricular formats. In contrast, researchers have sought to obtain

evidence to refine the clarity and coherence of their arguments, as well as to justify their conclusions. This contrast in the types of goals of knowledge development can account for some practitioner skepticism as their knowledge and experiences can contrast with what is found by researchers (Fusarelli, 2008). Although there is evidence in the field that research knowledge is valued more than practitioner knowledge (Cochran-Smith & Lytle, 1990), at Sunnyville, practitioner knowledge appears to be more salient—at least in practice. This may be due to the fact that teachers use their colleagues as an immediate resource who can provide practical information that directly informs current challenges as they navigate the ever-evolving classroom environment.

Some challenges to long-standing knowledge hierarches and relationships between researcher and practitioner based knowledge are being raised. Scholars are questioning the assertion that research based knowledge, as currently constituted can inform practitioners of "what works" (Biesta, 2007). Some have recognized the impracticality of providing teachers recipes for teaching (McIntyre, 2005). Others have acknowledged the impact that context has on whether and how research findings can be utilized (Broekkamp & van Hout-Wolters, 2007). Consistent with this, researchers have recognized that practitioners need to have the ability to make judgements based on their own knowledge and the interpretations they have gathered from research (Biesta, 2007; Vanderinde & van Braak, 2010). This has been a shift in thinking away from research assuming a technical role, which informs teachers of what they should do, toward a more nuanced cultural role which enables teachers to interpret the research findings to gain a different understanding of their practice (Biesta, 2007). Although practitioner knowledge

and research knowledge differ, both perspectives may shape the understandings relating to the complexities that exist within the field.

The work of Broekkamp and van Hout-Wolters (2007) further illustrates how those sentiments about the hierarchies and relationships between research and practitioner based knowledge may be may be changing. The authors distributed a questionnaire to a group of 160 people that consisted of educational researchers (51), policy-makers (32), teacher trainers (20), teachers (19), students of educational science (12), teaching material designers (5), teachers in training (2) and miscellaneous roles (19). The participants communicated a need for practitioners to develop a "professional research attitude;" however, they agreed that practitioner knowledge and research knowledge should be considered complimentary and of equal value (Broekkamp and van Hout-Wolters, 2007, p. 214). Gore and Gitlin (2004) discussed that previously, practitioners were primarily cast as users of research knowledge instead of producers of relevant knowledge that could be of use to the field. Such perspectives have further reinforced the idea that educational experts were found outside of the classroom instead of within (McIntyre, 2005). Smith and Lytle (2017) asserted that scholars must move beyond the characterization of teachers as technicians who are positioned to implement research findings to acknowledging their role in codifying what is known about education. Providing opportunities for research knowledge and practitioner knowledge to be equally valued may encourage boundary crossing activities on an interpersonal level.

Boundaries at the Intrapersonal Level

Values, beliefs, and identity are factors within the individual that can reinforce the boundaries between educational research and practice. For practitioners and researchers, their sense of identity can influence their ability to cross boundaries. When describing the

role of identity on the intrapersonal level, Akkerman and Bruining (2016) explained that professionals negotiate hybrid professional identities as they take on some of the characteristics of the other professionals they interact with at the boundary. For instance, some scholars may not associate the dissemination of knowledge or interactions with practitioners as being part of their professional identities. Instead, their identities may be tightly aligned to the production of knowledge with the professional aim to contribute to the generalized knowledge base. In order for researchers to engage in boundary crossing, they may have to expand their identities to encapsulate their roles of mentors, partners, knowledge bearers, or collaborators with practitioners. Conversely, practitioners have their own professional identities. Practitioners' identities are constructed as they interact with others in their professional context (Beauchamp & Thomas, 2009). The authors also identified practitioners' sense of self as being a key component in their identity development. Further, the authors asserted that practitioners' personal and professional identities are influenced by the factors of emotion, reflection, agency, and context. Emotion, reflection, and agency are impacted by the context in which they work.

In the school environment, the population of students, colleagues, and administrators are crucial in shaping practitioners' identity (Beauchamp & Thomas, 2009). Practitioners' interactions with their students, colleges, and the administration can influence their emotions and sense of agency. When practitioners have a sense of agency, they feel a sense of empowerment that they can have an impact on reaching their own goals or altering their professional context (Beauchamp & Thomas, 2009). All of these factors can influence practitioners' identity within their own profession, but their identities may also be altered as they interact with other professionals at the boundary. As

practitioners engage with research or researchers at the boundary, their professional identities may need to shift to participate in tasks typically associated with researchers. If practitioners or researchers are unable or unwilling to expand upon their professional identities, then boundary crossing will not occur at the intrapersonal level.

Individual beliefs are also important to consider when promoting boundary crossing. Pajares (1992) contended that there is an understood difference between beliefs and knowledge; beliefs are based on judgment, while knowledge is has its foundation in objective fact. Although beliefs and knowledge may be considered separate constructs, they can influence one another. For instance, Pajares described how beliefs are influenced by human perception and how that perception can be faulty. The author stated that "beliefs influence how individuals characterize phenomena, make sense of the world, and estimate covariation. They influence even cognitive knowledge" (Pajares, 1992, p. 310). If Pajares' assertions are correct, then beliefs must be considered as salient in boundary crossing as people might interact with information that may challenge their beliefs. Pajares described how practitioners' educational beliefs are rooted in their own experiences as students. This belief system grows with practitioners' experience in the classroom as they create a personalized pedagogy (Kagan, 1992). In classrooms, practitioners have moments of uncertainty where a cognitive response might fail and instead their beliefs, which are based on past experiences, can support their thinking (Pajares, 1992).

Practitioners' beliefs influence their practice and their receptivity to new knowledge (Kagan, 1992; Kennedy, 1997). Kennedy explained that providing practitioners with knowledge does not necessarily lead to changes in practice due to the

power of beliefs. Furthermore, the author asserted that practitioners can reject information that counters their beliefs and research that reinforces their beliefs may be more readily accepted. In addition, practitioners may continue to hold onto beliefs based upon inaccurate knowledge even after being presented with the scientifically correct information (Pajares, 1992). Kennedy (1997) expanded on Pajares' (1992) assertion by outlining three instances when beliefs are most resistant to change: beliefs that are formed during childhood, those that are closely associated with an individual's identity, and when beliefs are connected to one another. For example, practitioner beliefs about how students learn relate to the conception of their role, which relates to the type of curriculum they prefer, is just one example of how beliefs can be connected to one another. Their complexity can make individual belief system can be difficult to fully deconstruct, characterize, and alter.

In order for practitioners to make crossing boundaries fruitful, they must be able to gather information that may challenge their recognized or unrecognized beliefs. Kagan (1992) asserted that in order for individuals to learn something new, they must experience a conceptual change in their beliefs. The author provided three suggestions to incite conceptual change. The first is that individuals must be required to make their implicit beliefs explicit. Secondly, the inadequacy or the inconsistency of their beliefs must be confronted and lastly, they must be provided time to examine, elaborate, and integrate new information into their existing belief systems. The author explained that any attempt to change behavior will not be successful until there is a change in personal beliefs. Boundary crossing at the intrapersonal level cannot be ignored when practitioners and researchers enter a space that may challenge to their established identities and beliefs.

The Potential Influence of Boundary Width

In the body of related literature, researchers have described a number of factors at the institutional, interpersonal, and intrapersonal levels that make successful boundary crossing challenging between researchers and practitioners. It is not only the level at which the boundary is traversed that can cause difficulty but also the variance in the divide between specific research disciplines and practice. This concept is discussed in the piece by John T. Breur (1997) entitled "Education and the Brain: A Bridge too Far." In this seminal work, Breur laid the foundation from which many scholars have built their arguments as they aim to affirm or negate the relevance of the field of neuroscience to influence educational practice. In the article, the author argued that advocates for the neuroscience and education connection are trying to "build a bridge too far" (Breur, 1997, p.4). Breur suggested that the gap between education and neuroscience is just too far to be "bridged" or, when borrowing language from a boundary perspective, that the boundary is too wide to be crossed. Instead, he contended that the field of cognitive psychology already provides a better connection between two fields as it studies the mind and mental function (Breur, 1997). Throughout the article, Breur provided many examples of the failures of neuroscientific researchers to provide useable information to practitioners. Conversely, he also provided examples illustrating how cognitive psychology has directly impacted educational practice. The author also asserted that the gap between cognitive psychology and practice can more easily be bridged because this gap is smaller.

Whether using a bridge or boundary metaphor, the work of Breur and others can be seen as detailing how the width of the boundary between specific research disciplines and educational practice may be a useful way to conceptualize the challenges or likely

promise of boundary crossing efforts. To further examine the consideration of the impact of the relative width of a boundary, the current researcher conducted a close examination of the literature describing the boundary between neuroscience research and educational practice. The researcher then explored and documented some of the complexities that can prevent the crossing of boundaries that are perceived as being expansive and wide.

Neuroscience and Education: A Well Examined Boundary in the Research Literature

Several scholars have supported Breur's (1997) assertion that the boundary between neuroscience and education is in fact too wide to be crossed, while others have disagreed with those claims. This debate has created a close examination of this particular boundary in the literature and, as such, provides a depth of knowledge about the salient factors and possible solutions when aiming to cross a boundary. Neuroscience findings have impacted some of the practices at Sunnyville. The learning specialist analyzes the educational evaluations of her students, which provides a cognitive profile. The information from the evaluation would be combined with what she knew of the brain to make instructional changes. In another instance, the use of neuroscience research was used to encourage the head of school and the faculty to incorporate more physical activity and mindfulness practice throughout the school day. With that said, neuroscience research is not readily referenced at Sunnyville to make curricular selections or decisions about daily instructional practice. In the paragraphs that follow, the researcher will examine the boundary between neuroscience research and educational practice on the institutional, interpersonal, and intrapersonal levels.

Factors Contributing to the Boundary Between Education and Neuroscience

The terms boundary language, boundary people, boundary objects, and boundary work are used to organize the analysis of the difficulties that can occur when trying to cross the wide boundary between neuroscience research and educational practice. These terms are used to describe the boundary when it becomes a space for potential learning. In this analysis, the researcher will use these terms to explain areas that will need to be addressed in order for stakeholders to have more success in traversing the wide boundary between neuroscience research and practice.

Institutional: Inadequate professional development, teacher training, and opportunities for collaboration. Scholars have emphasized the importance of adequately training teachers in understanding neuroscience and other disciplines that contribute to the science of learning (Geake & Cooper, 2003; Hardiman, Rinne, Gregory, & Yarmolinskaya, 2012). Ensuring that teacher preparation programs are evolving with the advent of new research is salient if the fields of neuroscience and education desire to align. Training teachers in understanding neuroscience concepts can increase their knowledge of how students learn, their developing minds and brains, and can inform instructional practice (Ansari & Coch, 2006; Hardiman et al., 2012). Training teachers in the basics of neuroscience would help them to be more critical evaluators of research findings (Ansari & Coch, 2006; Hardiman et al., 2012). These are just some changes that need to take place at the institutional level to encourage boundary crossing amongst teachers.

Several scholars have pointed to the emerging field of neuroeducation, citing that some programs at prominent universities are developing platforms to train teachers to become consumers of research in these interdisciplinary fields (Ansari & Coch, 2006;

Blake & Gardner, 2007; Hardiman et al., 2012; Tommerdahl, 2010). Neuroeducation programs, however, have yet to be widely adopted within education departments at the university level (Blake & Gardner, 2007). The creation of neuroeducation programs and new research-focused teacher education programs may aid in the development of interdisciplinary educators and researchers who could more easily cross boundaries (Ansari, Coch, & De Smedt, 2011). Unfortunately, these programs often fail to address the needs of those teachers who are already practicing in the field.

To educate current teachers about salient neuroscientific concepts, Dubinsky, Roehrig, and Varma (2013) conducted a study to analyze the effectiveness of teacher professional development workshops entitled BrainU on a sample of 216 middle school teachers, primarily science teachers. BrainU was a 1- to 2-week workshop that teachers attended in the summer each year, for up to a 3-year period. BrainU's program focused on delivering "inquiry-based experiences illustrating synaptic function, plasticity, and emergent complexity as a basis for teaching and learning" (Dubinsky et al., 2013, p. 320). The researchers assessed neuroscience knowledge pre and post intervention and conducted observations to assess effects on teacher pedagogy. The results showed an increase in teacher knowledge of neuroscience after the end of their participation in BrainU. Additionally, teacher pedagogy became more student centered and the teachers had a greater awareness for how their actions had the capacity to alter students' brains. Information from studies such as these can inform possible solutions for improving boundary crossing as well as perhaps uncovering new difficulties. While professional development and teacher education programs can provide opportunities for educators to

access neuroscience research, there are larger problems that exist within the ability for education's research infrastructure to inform instructional practice.

The current research infrastructures may act as barriers for those who try to engage in boundary work. With multiple disciplines working to inform and improve educational practice, some have called for an updated research infrastructure. This infrastructure would enhance the connection between research, educational practice, and policy (Fischer, 2009; Fischer, Goswami, & Geake, 2010). A research infrastructure that supports the integration of science and practice is one form of institutional change that can help breach the boundary (Edelenbosch et al., 2015). Scholars have suggested translational research as a possible model for directing changes to the infrastructure of the education field (Hille, 2011). Translational research is practiced in the medical field as practitioners and researchers aim to quickly translate new research into better healthcare practices (Hille, 2011). Other scholars have used the medical field as a model for education as they have developed systems for creating avenues for reciprocity between researchers and practitioners to improve patient outcomes (Ansari, 2008; Fischer et al., 2010; Hardiman et al., 2012). Some of the components of the research infrastructure the medical field has developed a foundation for the suggested changes in education.

Now that the fields of neuroscience and neuroeducation are researching learning, researchers have provided suggestions on how to best inform educational practice. Ansari et al. (2011) explained the importance of not creating a "hierarchy of knowledge" where neuroscience is viewed as the sole possessor of salient information and the educator in the role of consumer. This was echoed in the findings of Pickering and Howard-Jones (2007), who found through a survey of teachers' views of neuroscience that teachers did

not want to just be "told what works" (p. 112). Instead, the teachers expressed an interest in learning more about the brain and the mind and then decide how to best use that information in their classroom.

Ansari, De Smedt, and Grabner (2012) contended that is imperative to "level the playing field" between educators and neuroscientists (p.112). Several scholars have suggested that neuroscience research must begin to take place in actual education settings whenever possible to make educational practices available for scientific scrutiny and to collaborate with educators as co-investigators (Fischer et al., 2007; Geake, 2008; Hardiman et al., 2012; Szucs & Goswami, 2007; Tommerdahl, 2010). This may be difficult because it may not be possible to utilize many of the methods adopted by neuroscientists in a classroom setting, such as using fMRI technology. Current scholars have viewed neuroscience as a largely "laboratory-based endeavor" (Geake, 2008; Tommerdahl, 2010). If neuroscience is largely laboratory based, then one solution suggested by the literature is reshaping some aspects of schools so they can function, at least to some degree, as a laboratory.

Laboratory or research schools could provide an environment that is both an authentic learning environment and a lab for research. Ansari and Coch (2006) adamantly asserted assertion that neuroscience findings need to be tested rigorously in classroom settings before being considered a viable educational practice. Research schools could provide a space with that intention. John Dewey is an often cited as the founder of the laboratory school design (Fischer et al., 2010). Research schools or laboratory schools are often partnered with universities to create a space where educators and researchers can collaborate to inform educational practice (Fischer, 2009; Fischer et al., 2010; Hille,

2011). While some research schools do exist, they have not been widely adopted and some have separated from their research origins (Fischer et al., 2010). Although the boundary between neuroscience research and educational practice may seem too far to cross, it is important to consider what knowledge could be gained from this journey.

Interpersonal: The absence of a common language. Through the boundary perspective, researchers have described boundary language in a number of ways. First, Beauchamp and Beauchamp (2013) described the language used to describe the relationship between neuroscience and education as one form of boundary language. These authors asserted that the relationship between the two fields is often referred to as a boundary, gap, or division. They also described that there is positive language associated with neuroscience-education relationship as scholars refer to it as a hybrid field with the possibility of collaboration, community, and knowledge-sharing. The boundary perspective outlines differences in the language used by members of each discipline in their interactions (Beauchamp & Beauchamp, 2013). This will be the focus of the literature reviewed in this section.

The literature often reported a lack of common language between the fields of education and neuroscience as a factor contributing to the boundary. Varma, McCandliss, and Schwartz (2008) explained that the vocabulary utilized by educators originates from the social sciences. Terms such as *understanding* and *identity* are examples of the sorts of mental terms used by the field. In contrast, the biological sciences have influenced the vocabulary used by neuroscientists. Common neuroscientific vocabulary includes material terms such as *white matter tract* and *hemodynamic response*, which are used to describe the brain's physical attributes.

Even when neuroscientists and educators use similar terminology, miscommunications may still occur. Howard-Jones (2008) explained that an educator's perspective of *learning* can differ from a neuroscientist's definition of the term. Neuroscientists often associate learning with memory, which results from various patterns of neural connectivity. In contrast, Howard-Jones asserted that educators' ideas of learning focus on concepts such as social construction, learning within groups and communities, and the importance of context in learning. This illustrates how neuroscientists view learning from a biological perspective, while educators' perspectives are influenced more from the social sciences. Horvath and Donoghue (2016) provided another example supporting Howard-Jones' (2008) illustrations of communication difficulties. These authors used the example of how a simple discussion between educators and neuroscientists about reading can be made complicated by the fact that "there is no single part of the brain that reads" (Horvath & Donoghue, 2016, p. 5). Instead, the authors discussed that reading occurs in many areas of the brain. The brain's complex interconnectivity does not allow for simple communication about the cognitive activity that occurs when reading. The absence of a common language can damper communication when it does occur, and this can also be a factor in preventing interactions between stakeholders in the two fields.

The difficulty in communication between fields often results in the prevalence of neuromyths. Neuromyths is a term first coined by the Organization for Economic Co-operation and Development (OECD) in 2002 (Tardif, Doudin, & Meylan, 2015). The OECD defined neuromyths as misconceptions about the brain and its functions (Tardif et al., 2015). Although neuromyths lead to generalizations and misconceptions, they often

originate from a misinterpretation of scientific understandings (Howard-Jones, 2008). Several researchers have explored how neuromyths enter the teaching profession.

The adoption of neuromyths is most likely an international phenomenon as it has been documented amongst teachers in the United Kingdom, the United States, the Netherlands, Switzerland, and Portugal (Dekker, Lee, Howard-Jones, & Jolles, 2012; Rato, Abreu, & Castro-Caladas, 2013; Serpati & Loughan, 2012; Tardif et al., 2015). In addition, Ratio (2015) et al. discovered that beliefs in neuromyths were found in participants across areas of teaching, expertise, and level of education. This illustrates the pervasiveness of neuromyths, as well as the more general idea that when inaccurate knowledge is shared, it can be difficult to extinguish its movement throughout the field.

In a study by Dekker et al. (2012), the authors found that 49% of the 242 survey participants from the United Kingdom and the Netherlands agreed with statements on the questionnaire that promoted neuromyths. The most prevalent neuromyths chosen by the teachers in the study included: teaching to learning styles,[1] hemispheric dominance,[2] and exercises to improve right and left brain hemispheric function[3] (Dekker et al., 2012). While these neuromyths were also prevalent in the Rato et al. (2013) and Tardif et al. (2015) studies, researchers have reported many other neuromyths that exist, such as

[1] A set of learner characteristics, often described as visual, auditory, or kinesthetic, that influences their response to various teaching strategies (Howard-Jones, 2010).

[2] The dominance of one side of the brain can be used to describe the characteristics of learners (Dekker et al., 2012).

[3] This is commonly referred to as brain gym, which is a commercialized program that includes exercises to balance the hemispheres of the brain (Dekker et al., 2012; Howard – Jones, 2010).

multiple intelligences theory,[4] using only 10% of the brain, and critical periods[5] for learning (Geake, 2008; Goswami, 2004; Howard-Jones, 2010). One of the elements that contributes to the pervasiveness of neuromyths is the number of sources perpetuating their adoption.

Educators can obtain information about neuroscience, learning, and teaching in a number of places that produce claims and apply them without much scrutiny. Alarmingly, scholars have shown that neuromyths can be derived from numerous sources from the media to teacher education programs (Dekker et al., 2012; Rato et al., 2013; Tardif et al., 2015). Rato et al. (2013) found television and the Internet to be the most popular source of information for teachers. It is interesting, and perhaps unsurprising, to note that none of the most utilized sources mentioned were academic journals, which is the most common mechanism for the dissemination of scholarly knowledge. This disconnect between where educators acquire and how scholars communicate information illustrates a difficulty that can occur when attempting to cross the boundary, which could account for some of the inaccurate knowledge perpetuated by neuromyths. Tardif et al. (2015) and Dekker et al. (2012) concluded that teacher education programs were sources of information supporting the spread of neuromyths as well. This may be more concerning, as teacher education programs should a mechanism for accurate knowledge-sharing as journals would be more readily accessed by educators in this setting. Practitioners who want to learn more about the brain may look to education programs for information. To

[4] Can be defined as individuals possessing a few independent intelligences instead of one all encompassing intelligence (Howard-Jones, 2010).

[5] Critical periods are "windows in time when a child can learn a particular skill or ability" (Howard-Jones, 2010, p. 26).

that end, Dekker et al. discovered that teachers who were more interested and knowledgeable about the brain were more likely to believe the neuromyths. Neuromyths abound, even—and especially—among those who are most enthusiastic about neuroscience research, because these individuals may be most likely to gather information from a plethora of sources—including those that fail to provide accurate information.

Scholars have provided many reasons for the prevalence of neuromyths and suggestions for how to best combat their continued adoption. Some have scholars attributed the continued use of neuromyths to the difficulties educators have in understanding and applying information from the neuroscience fields (Edelenbosch et al., 2015; Geake, 2008; Szucs & Goswami, 2007). In the Edelenbosch et al. (2015) study of 14 neuroscientists in the Netherlands, the authors revealed that the scientists interviewed doubted educators' abilities to understand and interpret neuroscientific findings, as their knowledge of the brain is limited. Hardiman et al. (2012) defended educators in her assertion that there is not ample research from the neuroscience community that is easily translatable. Additionally, Hardiman et al. asserted that educators' implementation of neuromyths reinforces the belief that they lack the ability to understand and apply research, instead of not simply acquiring the necessary knowledge to do so.

There is further discussion that the frequency of neuromyths could have a negative effect on the field of neuroscience and especially the interdisciplinary workings of neuroeducation (Edelenbosch et al., 2015; Hardiman et al., 2012; Szucs & Goswami, 2007). Neuromyths could undermine the legitimacy of the neuroscience and education connection highlighting the difficulties that persist in applying research findings to

educational settings. Edelenbosch et al. (2015) reported that some neuroscientists contend that it is unethical to provide research findings that have not been adequately tested in the field. In addition, some of the neuroscientists interviewed in the study suggested that education professionals should learn to be more critical toward media reports of neuroscientific information and brain based materials (Edelenbosch et al., 2015). Instructing teachers in becoming critical consumers of research is a goal of the neuroeducation field; this will enable teachers to accurately apply the information to their professional context (Hardiman et al., 2012). Providing educators with the skills needed to be critical consumers of neuroscience research could promote fruitful boundary crossing and could prevent neuromyths from developing, or at least from propagating so widely and for so long. The common goal of ending the spread of a multitude neuromyths could be another useful target guiding and fostering collaborations between educators, neuroscientists and other stakeholders, as well as taking a closer examination of the tools and opportunities for crossing the education-neuroscience boundary.

Intrapersonal: The need for a hybrid professional. Those who cross the boundary can take on many roles as they aim to navigate the space between neuroscience research and practice. Edelenbosch et al. (2015) described boundary people as those who could act as boundary crossing actors. These could be members from each field who engage in boundary crossing activities, or they could be a hybrid professional who has expertise in both fields.

Participants in the Pickering and Howard-Jones (2007) study documented suggestions for improving communication between neuroscientists and practitioners. Two hundred educators primarily from the United Kingdom and some from international

locations were surveyed or interviewed in the study. The majority of participants were surveyed using a five-question survey while they were attending a conference about the brain and learning. The educators cited lacks of two-way communication, relevance of research findings to the classroom, and easily accessible information as barriers to communication between the two fields. These suggestions from teachers to further improve communication between the disciplines mirror many of the suggestions made by scholars in the literature.

The educators in the Pickering and Howard-Jones (2007) study suggested the development of a hybrid professional that could serve as an intermediary to help translate information between the two fields. These hybrid professionals are found in the literature under many names: middleman, neuroeducator, translators, researcher-practitioners, and educational engineers (Ansari et al., 2012; Beauchamp & Beauchamp, 2013; Edelenbosch et al., 2015; Fischer, 2009; Fischer et al., 2010; Szucs & Goswami, 2007). This middleman is often portrayed in the literature of possessing the role of translator who can go between the two fields (Edelenbosch et al., 2015). Some scholars have described the middleman as being well versed in neuroscience, genetics, human development, educational practice, research methods, instructional design, and cognitive science—among other disciplines (Ansari et al., 2012; Fischer, 2009; Fischer et al., 2010). These middlemen would not only be responsible for translating information between fields, but also for finding ways of integrating the fields (Beauchamp & Beauchamp, 2013; Fischer et al., 2010). Some scholars have argued that this may not be a realistic endeavor, as the breadth of the fields involved in such communication would be difficult for a single person to encompass (Beuchamp & Beuchamp, 2013; Hardiman et

al., 2012). While these interdisciplinary middlemen might be useful in the short term to begin collaboration, some researchers have asserted that in the long term, teacher preparation programs will have to train teachers to understand research in the learning sciences, including neuroscience (Hardiman et al., 2012).

The Factors are Identified, Yet the Boundary Pervades

Researchers who have examined the boundary between general education research and between neuroscience and education have outlined the factors that have contributed to diminished knowledge-sharing in the field. At the institutional level, many organizational changes within schools can be made to improve the opportunities practitioners can have to obtain knowledge from the research community and one another. Practitioners need to have time built into their day to collaborate with their peers to promote knowledge-sharing. In addition, they need time and support to access, read, analyze, and utilize research knowledge. Practitioners need to have opportunities to be engaged in the decision-making processes at the school, instead of traditional hierarchal structures that support unilateral decision-making by administrators.

At the interpersonal level, the education field should examine practices that perpetuate a value for research knowledge over practitioner knowledge. Opportunities for both forms of knowledge to influence one another to improve the adequate conceptualization of complex educational problems and may aid in the development of more innovative solutions. Allowing for more research-practitioner interactions will build educators' trust in research findings and improve the practicality of their implementation.

Identity and beliefs are factors that can influence boundary crossing on the intrapersonal level. In order for fruitful boundary crossing to occur, researchers might have to take on the role of knowledge-sharing and collaboration with educators, which

may require them to look beyond their goals as a researcher. Practitioners may need to expand their identities to participate in some activities that are traditionally reserved for researchers. In both instances, their identities may begin to take on the form of hybrid professionals who have characteristics of both disciplines. Beliefs can also impede boundary crossing, as researchers may believe that practitioners do not have the ability to utilize research, thus making their interactions with them unnecessary. Practitioners may easily reject any research knowledge that contradicts their beliefs.

Some of these factors have been observed at Sunnyville, as teachers do not often engage in boundary crossing with one another or the research community. As a result, many educational decisions are made by the head of school, and it is unclear whether a process exists that gathers knowledge from the research or Sunnyville faculty before decisions are made. It is also unclear whether the Sunnyville faculty utilizes educational research in their decision-making. The width of the boundary between neuroscience and educational practice at Sunnyville is also unknown. In the next chapter, the researcher will outline the steps that were taken to examine more closely the knowledge that informs the teachers' decision-making practices at Sunnyville.

Chapter 2: An Assessment of the Gap that May Exist Between Educational Research and Practice at Sunnyville Elementary School

Numerous factors reinforce boundaries that exist between educational practice and research on an institutional, interpersonal, and intrapersonal level. At the institutional level, Sunnyville has some structures in place to cultivate collaboration among grade level partners, support teachers, counselors, and the head of school. Additionally, there are meeting times scheduled when specialists can meet with one another and the aforementioned personnel. Although some effort has been made to build in times for colleagues to meet, there are not many opportunities for teachers to engage across grade levels or for teachers and specialists to collaborate. Time and scheduling conflicts often influence collaboration efforts and knowledge-sharing. At the interpersonal level, Sunnyville teachers seemed to value contextual knowledge over primary research knowledge as it relates to practice. This was observed in how they often site their own experiences or those of their colleagues when making decisions instead of the research community. Intrapersonal factors, such as the extent to which practitioners' identities and beliefs impact their use of research and decision-making practices, was not yet explicitly known. In this investigation, the researcher explored whether teacher practices or beliefs at this site reflect typical boundary features that prevent effective knowledge-sharing between educational practice and research. The researcher paid specific attention to assessing the use of neuroscience research as a way of grasping the features of a potentially wider boundary. It is interesting to observe that the boundary crossing deficits are evident both in what was observable and by the absence of behaviors or beliefs that would be expected if boundary crossing was part of the culture.

Context of Study

Sunnyville is a prekindergarten through fifth grade independent school that has the freedom to be innovative. As an independent school, it is not held to federal and state guidelines that focus on standards and standardized testing. Students take part in a balanced curriculum that includes specialty areas (i.e., art, music, physical education, Spanish, etc.) and content area subjects (i.e., reading, math, writing, science, etc.).

To establish context, the researcher conducted formal observations in the first grade, third grade, fourth grade, science, and music classrooms. In addition, informal observations were conducted during a professional development opportunity and in a common hallway area. In combination, these observations revealed many positive and supportive interactions between teachers and students. This was reflected in the respectful soft tones in teachers' voices as they communicated and redirected students. Instructional practices were observed to vary between teachers. Some teachers were more comfortable utilizing practices that are teacher-centered, while others seemed to prefer student-centered practices. The science and third grade teacher employed many student-centered practices such as one on one instruction and small group cooperative learning activities. In contrast, the fourth and first grade teachers could often be observed leading a lesson or discussions in the meeting spaces or at the front of the room. The writing and reading curriculums encourage more student-centered practices, such as individual conferencing. Informal observations revealed boundaries that were not readily observable unless the observer knew what to look for. For example, when sitting with colleagues to discuss student needs, teachers referred to assessing a student's learning style or using multiple intelligence theory to explain behavior. Both of these concepts are common neuromyths that reflect the boundaries that inhibit effective communication between research and

practice. As described previously, neuromyths are common misconceptions about the brain and how it functions (Tardif et al., 2015).

One factor that reinforces the boundary is the lack of interaction between the research community and educators. When walking down the halls or when participating professional development, teachers were not observed interacting with research literature. When observing a professional development program, a professor from a local university came to discuss the importance of establishing trust with the students and with one's colleagues. During the professional development, the teachers sat in rows as the professor spoke using a slide show. The teachers did not interact with research of any kind except for what was referenced in the presentation. No one from the audience asked for information about how to access the research presented, nor they did critique the ideas and research shared. While this may be an example of how research can be shared with practitioners, it also illustrates a very passive model that fails to provide teachers with an opportunity to critique, analyze, or utilize the knowledge dispensed. Outside of professional development, when conversing about practice the teachers often discuss ideas they found on a website or a concept from the curriculum. A culture of sharing and critiquing new research from the field does not appear to exist at this site. Tangibly, there are not scientists from any discipline working with teachers in a collaborative manner to better inform instruction or to inform research practices. These are just a few formal and informal observations that suggest manifestations of the boundary characteristics between education research and practice at Sunnyville.

Statement of Purpose

In Akkerman and Bakker's (2011) seminal literature review of 181 boundary crossing studies, the researchers defined a boundary as the "sociocultural differences

leading to discontinuities in action and interaction" (p. 152). Crossing a boundary, as Akkerman and Bakker defined, would be akin to crossing a geopolitical boundary between countries where norms and values are also expected to be different. In the case of boundaries between research and practice communities, an example of a discontinuity in action and interaction might include the common practices of information dissemination within each community. In the current infrastructure, research knowledge is housed predominately within universities and distributed through books, academic journals, conferences, and degree-based courses (Abodeeb-Gentile et al., 2016; Ovenden-Hope & la Velle, 2015). Conversely, research articles are resources that education students and practicing teachers have limited time to read and absorb (Ovenden-Hope & la Velle, 2015). In addition, Dagenais et al. (2012) described the tradition of valuing academic knowledge over knowledge generated in practical contexts. Historically, scholars have made efforts to promote fruitful boundary crossing between the research and practice; however, such efforts have not garnered the intended results.

The purpose of this needs assessment was to more precisely describe the factors that reinforce a possible boundary between Sunnyville and education research. This was achieved through a survey that assesses the extent to which the teachers interact with research. To achieve this goal, the researcher administered a survey to address the following research questions:

RQ1: Where do teachers obtain information to inform their instructional practice?

RQ2: To what extent do teachers utilize information from neuroscience or neuroeducation?

The first question encompassed broad inquiries into teachers' overall information sources and information about the brain. This is salient as previous scholars have cited the need for a new research infrastructure that enables educators to be more informed consumers of research (Fischer, 2009; Fischer et al., 2010). Documenting the teachers' sources of information on neuroscience aligns with and can hopefully expand upon the study conducted by Pickering and Howard-Jones (2007). The second research question was informed by survey questions that asked about the teachers' interest toward possibly using neuroscience to inform their practice. Investigating teachers' familiarity with the new field of neuroeducation was also salient, as many scholars have supported its creation as a possible bridge between neuroscience and education (Hardiman et al., 2012). The professional context and research questions were guiding forces when the researcher was considering the appropriate methodology for this investigation.

Methodology

Participants

To investigate the boundaries at Sunnyville, assessing teachers and administrators seemed to be the most fruitful endeavor, as they directly impact educational practice. In the study, 36 teachers and one administrator were provided the survey (N=37). The teaching population consisted of classroom teachers, teacher assistants, support faculty, and specialist teachers. Classroom teachers are responsible for a class of students and for teaching the academic subjects of math, reading, writing, and social studies. Teacher assistants are only found in grades one and two. They provide assistance to the classroom teacher in instructional delivery and general responsibilities within the classroom. Support faculty included the PreK through second grade learning specialist, who supports students in the areas of reading, math, and writing. The specialist teachers instruct in a

particular subject area across numerous grade levels. These subject areas include wellness (i.e., social-emotional learning), science, Spanish, art, instrumental, music, computer, physical education, and library. There is one administrator in the building that holds the title of head of school. Forty percent (n=15) of the overall teaching faculty (N=37) completed the survey. The survey was given in April, which could have dampened the participation rates because teachers have many increased responsibilities as the school year comes to a close. If the survey was given at a less hectic time, there might have been more participation.

Nine of the 23 (39%) faculty respondents were classroom teachers. A similar percentage of specialist teachers, four out of 12 (33%), participated in the study. One administrator and learning specialist also participated. Of the 15 respondents, 10 (67%) held a master's degree and five (33%) possessed a bachelor's degree. The larger representation of teachers with a master's degree is representative of the larger teaching population at Sunnyville, as a master's degree is often preferred upon hiring. This desire for having an experienced faculty is also illustrated in the number of years teaching reported by the participants. Within the sample, three out of the 15 (20%) participants are novice teachers that have taught for 5 or fewer years. Conversely, 12 out of the 15 (80%) participants are considered veteran teachers who have taught for over 5 years. Of the veteran teacher respondents, 50% reported teaching for 9 to 10 years or and 50% had taught for 20 to 24 years. Demographic data were collected via voluntary self-report. Table 1 below summarizes the reported demographic information.

Table 1

Participant Demographic Information

Category	Corresponding Demographic Information	
Faculty Participants	39% classroom teachers 100% Administration	33% specialist teachers 100% Learning Support
Subjects Taught	Classroom Teachers: math, reading, writing, and social studies	Specialist Teachers: wellness, science, Spanish, art, instrumental, music, computer, physical education, and library
Education	67% master's degree	33% bachelor's degree
Experience	80% veteran teachers (more than 5 years teaching) 50% 9-10 years 50% 20-24 years	20% Novice (less than 5 years teaching)

Measures

While the literature suggests many factors that contribute to the boundaries between education and research, the goal of the needs assessment was to document where teachers obtain information to inform their instructional practice and the extent to which they utilize information from the field of neuroscience. These larger categories framed the specific factors related to the gap evaluated in the needs assessment and provide insight into how knowledge is acquired throughout the academy. Teachers remained constant as the independent variable throughout the study, and their responses to the questions represented the dependent variables. A copy of the survey instrument used is provided as Appendix A. Table 2 provides information about how the researcher gathered information to address each research question.

Table 2

Assessment of the Research Questions

Research Question	Item Number	Response Type	Goal
RQ1: Where do teachers obtain information to inform their instructional practice?	1	A checklist of choices and other was also an option as they could write in their own appropriate resource. The respondents could select all that apply.	To self-report types of informational sources used (e.g. curriculum, websites, academic journals etc.)
	2	Open-ended	To assist in determining the most salient sources as teachers may feel the need to select as many options as possible.
	5	A checklist of choices, no source, and other was an option as they could write their own appropriate resource. The respondents could select all that apply.	To self-report on types of possible resources they use to learn about the brain.
	3	Checklist with the options: much influence, some influence, little influence, and no influence	To assess the extent to which information on the brain influenced their instructional practice, curriculum content, school structure, teacher-student interactions, and behavior management.
	4	Open-ended	To assess the extent to which participants were using information about the workings of the brain in their classroom and to assess for neuromyths
RQ2: To what extent do teachers utilize information from neuroscience?	6	Checklist with the options: always used, sometimes used, neutral, and not used and space for an open-ended response	To assess the extent the teachers felt neuroscience should be used to inform educational practice.
	7	Checklist with the options: very interested, somewhat interested, neutral, and not interested and space for an open-ended response	To assess their interest in using information from neuroscience to inform their instructional practice.
	8	Checklist with the options: quite familiar, somewhat familiar, have heard of it and not familiar and space for an open-ended response	To assess their knowledge of the term neuroeducation

Data Collection Methods

A mixed methods survey was conducted to document and characterize the existence of boundaries at Sunnyville. The survey consisted of eight questions that were qualitative in nature; however, six of the questions included answer choices that allowed for some quantitative review. The goal in having qualitative and quantitative data was to analyze for an alignment between responses. Adding open-ended response questions could help minimize and detect social desirability bias (Schutt, 2015). Social desirability bias is the tendency for participants to select responses they detect as socially acceptable so as not to appear disagreeable (Schutt, 2015). Participants were provided the questionnaire with a consent form attached on a Friday, and they had 1 week to return both documents. Distributing the questionnaires on a Friday enabled the participants to use the weekend to complete it if they so desired. They were provided with an email explaining the procedures and were informed that their participation was voluntary. The questionnaires were delivered to the teachers' boxes with an envelope to seal each participant's responses. The faculty could either return the envelope to the researcher's school mailbox or to the researcher's office. Reminder emails were sent mid-week (Wednesday) as well as on the due date (Friday). Some participants asked to return their questionnaires on the Monday after the due date, so the researcher extended that to everyone to encourage as much participation as possible. Each day, the sealed envelopes were taken to the principal investigators' home, were opened, and filed. The data were compiled and analyzed using Microsoft Excel.

Summary of Results

RQ1: Where Do Teachers Obtain Information to Inform Their Instructional Practice?

Survey questions 1 and 2: Sources that inform instructional practice.

Questions 1 and 2 investigated the sources that teachers use to inform their instructional practice. Figure 1 presents the graphed results of these questions. The results demonstrate that teachers utilize many sources to inform their instruction. The most often utilized sources were the curriculum, professional development inside the school, professional development outside the school, and education websites. A number of teachers also selected "other" and write-in responses for information sources included their use of twitter (13%), past experiences (inside or outside the education field) (13%), or their students' needs (7%).

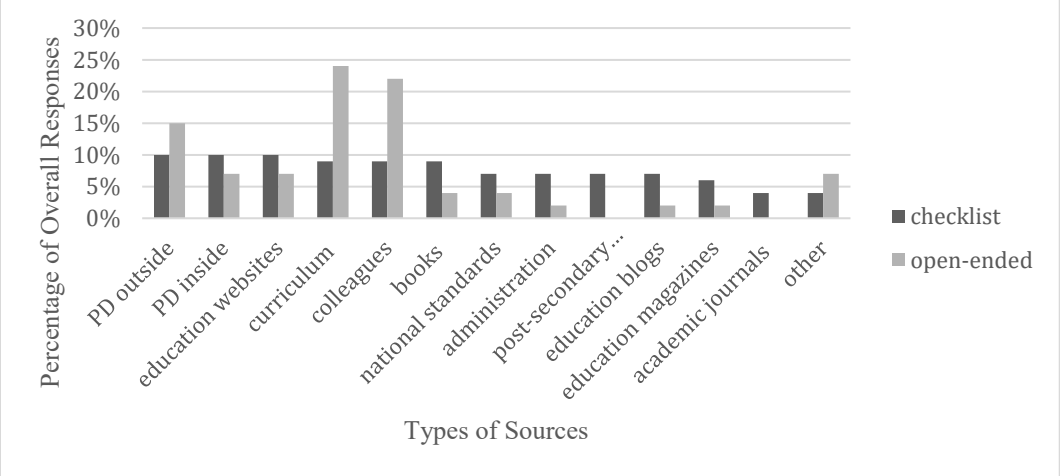


Figure 1. Sources of information most utilized by teachers.

Survey question 5: Sources about the role of the brain in education. To document the primary sources of information about the brain, the faculty members were provided a number of options from which to choose. The various choices are listed in Figure 2 with the compiled selections.

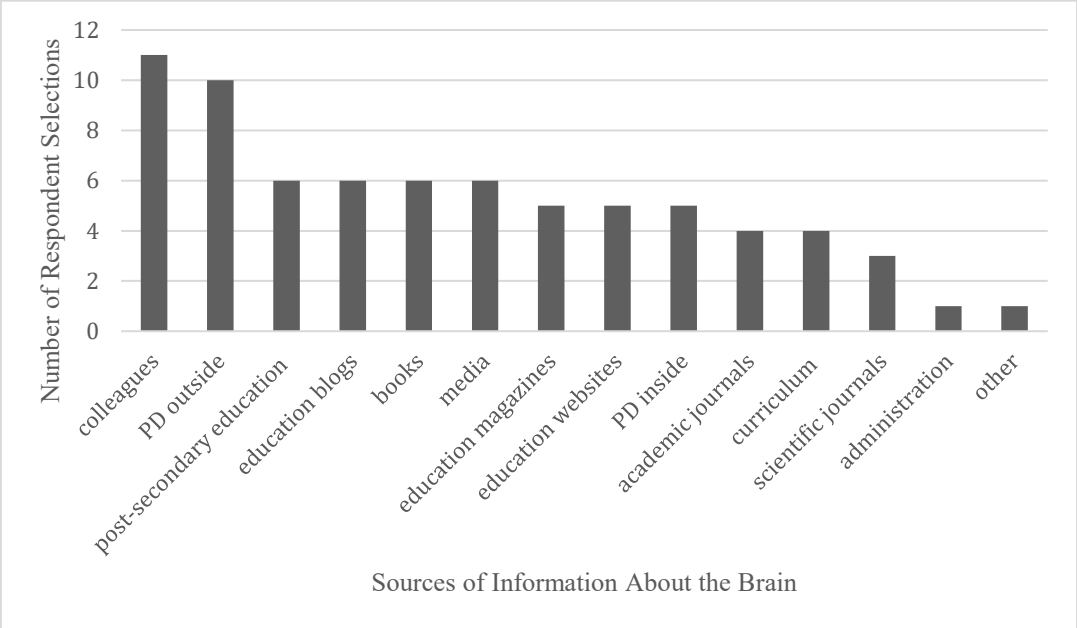


Figure 2. Sources that inform teachers about the brain.

Again, the use of colleagues and professional development are the sources most relied on for information about the brain. Additionally, education websites, education blogs, education magazines, and the media were identified more often by teachers as information sources than academic and scientific journals. Figure 3 compares where teachers obtain information generally and more specifically information about the brain to inform their practice.

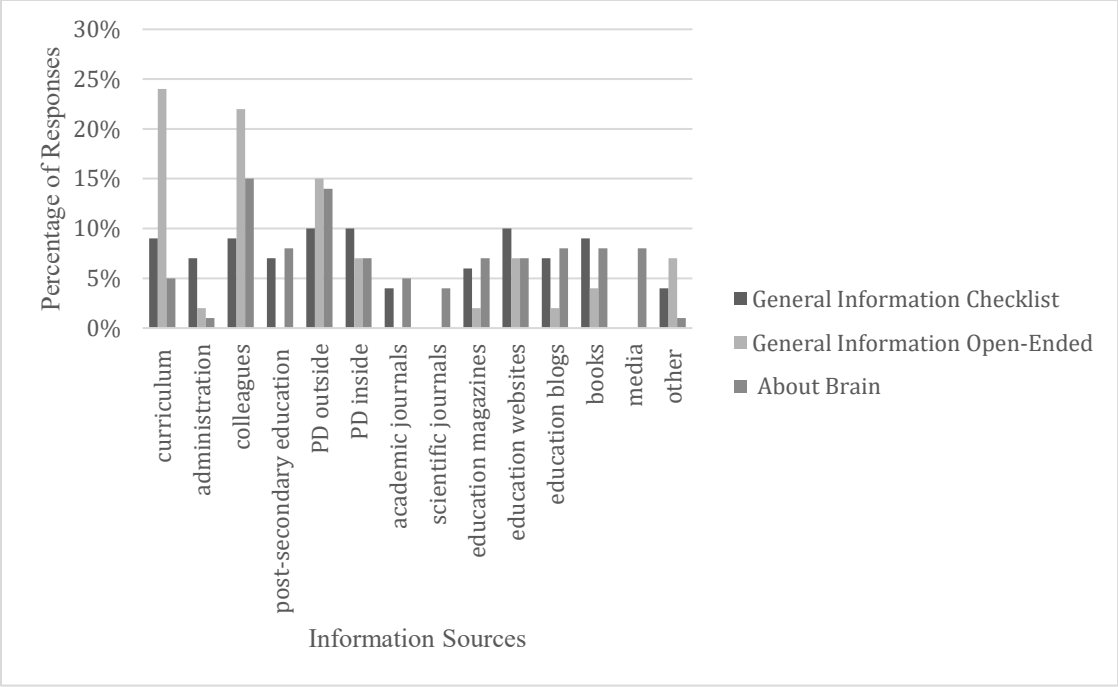


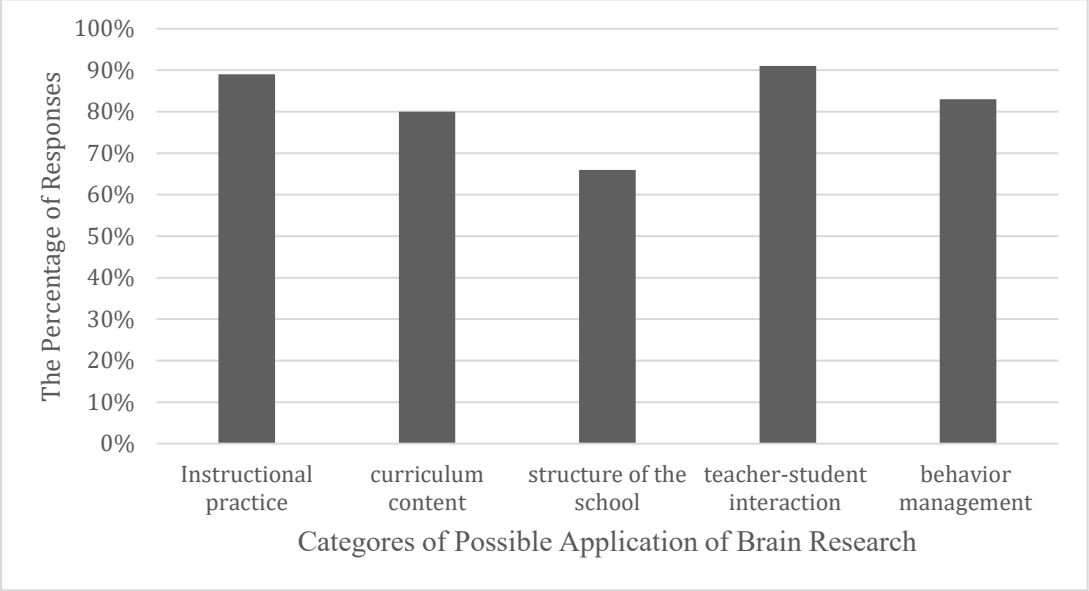
Figure 3. General information sources and sources about the brain compared.

The data indicated that the respondents utilize academic journals and their postsecondary education more when inquiring about information about the brain when compared to making more generalized inquiries about their practice. Now that the sources of information about the brain have been recognized, the researcher determined how the teachers apply that information.

RQ2: To What Extent do Teachers Utilize Information from Neuroscience or Neuroeducation?

Survey questions 3 and 4: The influence of brain knowledge on the various aspects of educational practice. To measure the extent to which educators are using knowledge about the brain to inform educational practice, they were provided various categories in a chart format. See Figure 4 for the results.

Figure 4. The extent that information about the brain informs educational practice.



When analyzing the results, teacher–student interaction (91%) and instructional practice (89%) were identified as being influenced the most by brain research. While all of the areas were shown to be impacted by brain research to some degree, the structure of the school was the least affected (66%). Question 3 was followed in the survey by question 4, which asked the respondents to explain the information about the workings of the brain they utilize in their classroom. The responses were analyzed and coded into categories using a matrix (Schutt, 2015). After the responses were analyzed into specific categories, those sub categories were then compiled into larger categories that reflect the themes in question 3. As a result, many of the responses fell into the categories of student-teacher interactions and instructional practice. This aligns with the data reported from the educators in question 3. Table 3 showcases the various subcategories for each of the broader themes.

Table 3

Compiled Matrix Data of Teachers Descriptions of How Teachers' Utilize Information About the Brain in Their Classrooms

Themes and Subcategories	Number of Responses
Instructional Practice	
processing	2
differentiation	5
individualization	6
kinesthetic/movement	8
novelty	1
repetition	1
activate prior knowledge	2
multisensory	4
executive functions	1
Student-Teacher Interactions	
student emotions	3
building relationships	6
social development	1
School Structure	
alternate seating	1
time for play	3
calm music	1
Curriculum Content	
Behavior Management	
meditation	1

Although teachers selected curriculum content and behavior management as being influenced by brain research, the open-ended responses did not yield similar results. Under instructional practice, the educators' responses focused on individualization with comments such as "providing various ways for students to learn the material" and "each of my students are individuals." This category highlights how the teachers have extrapolated a student-centered pedagogy from knowledge about the brain. Another area widely documented was the need for students to participate kinesthetic activities and to have opportunities for movement throughout the day. One teacher explained, "We use exercise and hands on activities to stimulate the brain." These educators' focus on

movement is most likely a direct result of attending a professional development program about the connection between movement and achievement as informed by the research of John Ratey (2013). The movement described is not similar to educational kinesiology or "Brain Gym" types of activities, which are often referred to as a common neuromyth. Ratey described how exercise influences brain development, which then improves student achievement. Student-teacher interactions included many subcategories related to the educators' acknowledgement of the importance of student emotions. Building relationships was noted most often; one educator explained, "The part that has been most influential in my career has been that children (and people) learn best in relationship mode." It is unclear whether this knowledge is the result of the respondents understanding of the brain or if it is more so the result of experience. Regardless, the respondent clearly perceived that on some level, there is a connection to the brain, as it was included in the response.

Survey question 8: Familiarity with the field of neuroeducation. The goal of the final question was to assess the teachers' knowledge about the term neuroeducation. Figure 5 displays the responses.

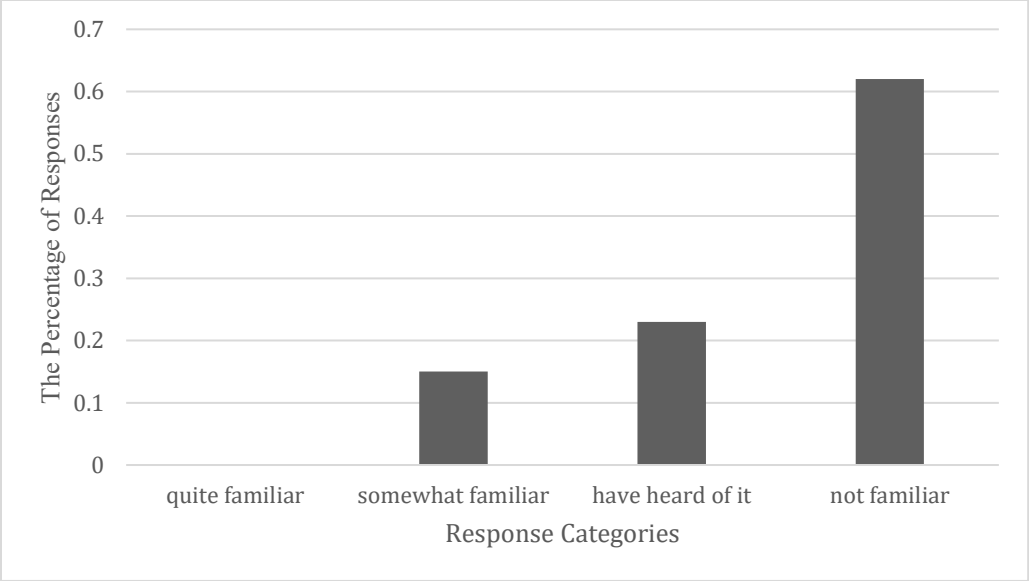


Figure 5. Teachers' knowledge of neuroeducation.

The majority of the educators were not familiar with this term. The few that selected *have heard of it* and *somewhat familiar* could not provide much information outside of what they could deduce from the combination of the two terms. For example, one teacher described neuroeducation as "collaborative effort between neuroscientists and educators to improve learners' experiences in the classroom." More research would have to be conducted to assess the extent of the participants' knowledge of the field of neuroeducation.

Survey questions 6 and 7: Using neuroscience to inform education. Question 6 asked educators to respond to the level that neuroscience should be used to inform educational practice. Figure 6 displays the results.

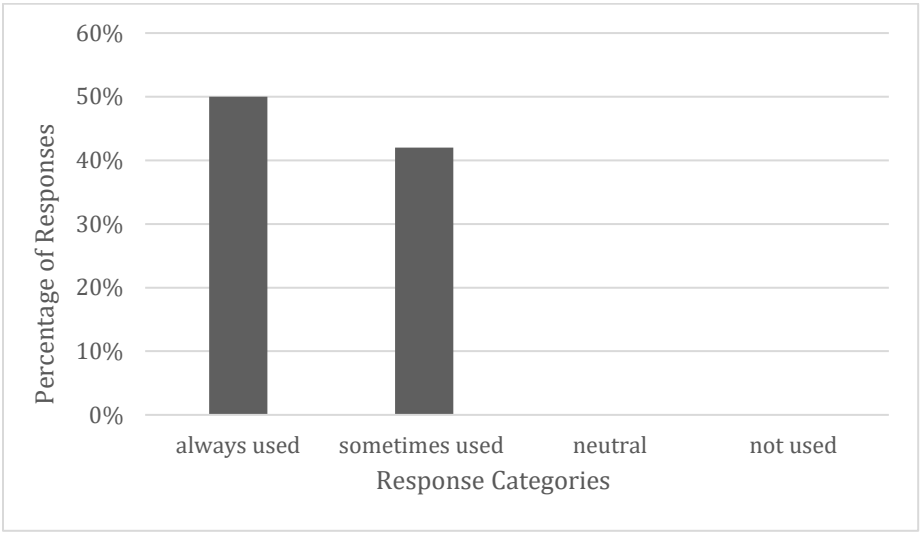


Figure 6. The extent to which neuroscience should be used to inform practice.

The results display a number of positive responses toward the use of neuroscience to inform practice. In the open-ended response portion, educators' positive responses reflect the theme that "more knowledge is better." While others who had more neutral responses had reservations about the "practical limitations." One teacher who responded positively when selecting a response commented, "While I believe it is important to keep neuroscience in mind in schools—it only makes sense. Sometimes things need to get done and the way things get done aren't always aligning with best neuroscience practices."

Question 7 aimed to explore the educators' desire to use neuroscience to inform their instructional practice. Figure 7 displays the results.

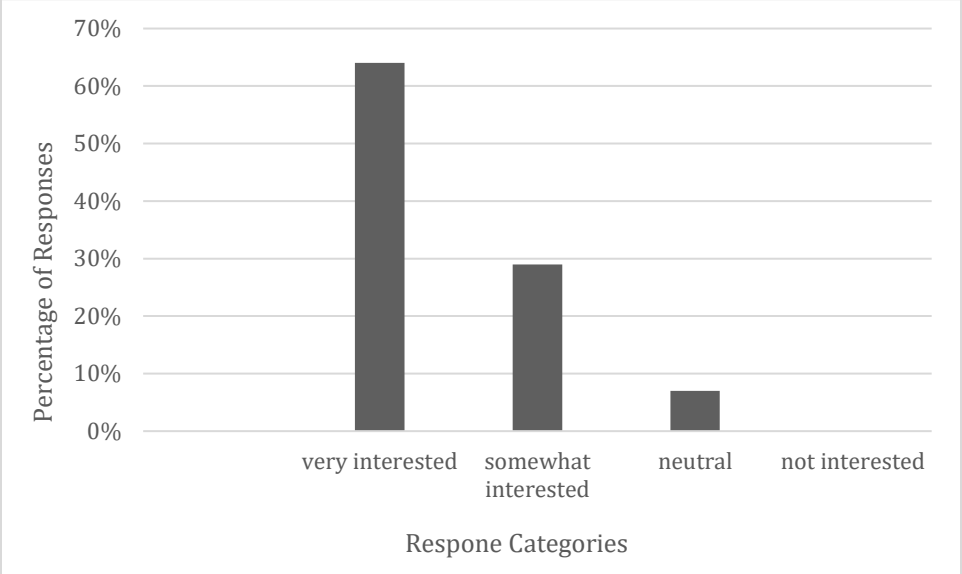


Figure 7. Teachers' interest in using information from neuroscience to inform educational practice.

Most of the educators were very interested as their open-ended responses again reflected a sense that "more information is better." In addition, teachers were interested in the possibility of incorporating neuroscientific findings into their instructional practice in order to, as one teacher noted, "best meet the needs of my students." Some respondents, however, noted some reservations. One teacher explained, "I would like to know more about why I should place more evidence on understanding the brain." Another mentioned, "I'm interested in learning more, but juggling that with keeping up on everything else is a challenge."

Discussion

The results of the survey suggested the possibility of a boundary that exists between educational research and the practitioners at Sunnyville. The survey results provided insight into the sources of knowledge practitioners at Sunnyville used to inform

their instructional decision-making. The boundary manifests in the results that indicate the most utilized sources teachers used to inform their decision-making about instructional practice are not the same sources most utilized by researchers to disseminate their research findings. Professional development outside of Sunnyville was one category that might expose teachers to information from the research community, as it is a format commonly used by scholars to disseminate knowledge.

When comparing the results of the checklist in question 1 to the open-ended results of question 2, for many of the categories the results do not align. Interestingly, the teachers did not mention academic journals or postsecondary education in the extended response, even though it was indicated as a source of information by six of the 15 respondents in the checklist. Academic journals were the most commonly utilized mechanism that scholars use to disseminate knowledge to practitioners (Abodeeb-Gentile et al., 2016). These results reveal academic journals to be the least referenced source amongst educators at Sunnyville. This illuminates a possible misalignment between how researchers often communicate their findings and the sources most referenced by practitioners to inform their instruction. This finding reinforces one factor often referenced in the literature: that teachers do not often read research journals (Kennedy, 1997; Levin et al., 2011; Marks & Louis, 1999; Ovenden-Hope & la Velle, 2015). It is important to note that the extent to which teachers are exposed to knowledge based on research from the other sources listed outside of journals is not known. For example, a practitioner may access knowledge on a website that compiles some research on a topic. These results, therefore, do not indicate that practitioners are not influenced by research, instead showcasing how sparingly teachers use academic journals. This finding may

indicate a minimal use of primary research that has not been filtered through or collected by a third party.

There were other differences among the data collected in the checklist and the open-ended question. Colleagues, curriculum, other, and outside professional development were reported as having a stronger presence in the second question than in the first. The increased use of colleagues and the curriculum might indicate some boundary crossing within the organization on an interpersonal level. This finding may allude to the value that practitioners place on practice-based knowledge over research knowledge. This point is further underscored by the decrease in sources reported outside of colleagues, curriculum, other, and outside professional development in the open-ended response question. In addition, no respondent mentioned research of any kind as a prominent source in the open-ended response question. This finding is in alignment with previous researchers' description of a need for a change in the education research infrastructure that calls for educators to interact more with research (Ansari, 2008; Fischer et al., 2007, 2010; Hardiman et al., 2012). Research infrastructure changes would align with the idea of the need to make changes that reinforce the boundary on an institutional level.

Survey results also indicated the extent to which educators accessed sources to learn about the brain, utilize information from neuroscience, their attitudes toward using neuroscience, and their understanding of the term neuroeducation. The respondents reported gathering information about the brain from numerous sources, which may make deciphering accurate information difficult. Colleagues and professional development outside of Sunnyville were the most predominant sources that may provide information

about the brain, academic journals and scientific journals are among the least referenced sources. This mirrors the data collected about the sources used to inform practitioners decision-making practices in general. One area of divergence in the data when compared to accessing sources in general was the curriculum. Unlike the first question, the curriculum was not identified as a primary source of information about the brain, which may indicate that curriculums utilized by the school may not be largely influenced by brain research. The minimal knowledge of the term neuroeducation may also be related to the primary use of other sources instead of research journals by the practitioners at Sunnyville. It may also be an indicator that the other sources that may position themselves between education research and practice to filter or synthesize research knowledge have not yet informed practitioners of neuroeducation. While educators may be able to access research-based information about the brain or other educational concepts though the plethora of sources referenced in this study, their access to that knowledge may be filtered or slowed by these mediators. Accessing journal articles may a more direct route to knowledge practitioners can then grapple with and can decide the relevance of. Practitioners may need to go through changes in identity to assume some characteristics of researchers if cross intrapersonal boundaries.

The survey results indicated that the practitioners had an interest in using neuroscience to inform educational practice. This mirrored the findings of the Pickering and Howard-Jones (2007) study, in which the researchers documented the interest educators had in neuroscience. The respondents communicated being interested in learning more about neuroscience but wanting to easily incorporate it into what they already do, was a common theme. This is slightly different result than that of the current

study, as the educators expressed a desire to not just be "told what works" (Pickering & Howard-Jones, 2007, p. 112). The teachers in this previous investigation expressed an interest in learning more about the brain and the mind and then decide how to best use that information in their classroom. At Sunnyville, the teachers presented more of a desire to know information that could be easily incorporated into their current practice. Teachers in the Pickering and Howard-Jones study displayed a greater sense of agency to decide how to best apply the information in the classroom, these findings were not replicated in this study. Additionally, accepting and utilizing information that challenges teachers' long-held educational beliefs may be difficult as boundaries begin to be crossed on an intrapersonal level. There is room for future research as the perspective of neuroscientists and their desire to inform education would be valuable addition to the practitioner's perspective.

Limitations

It is important to consider some limitations that were present this study. One limitation was the sample size; a more representative sample that included more respondents would have been preferred. In addition, administering survey at a less stressful time during the year most likely would have garnered more responses. Conducting semi-structured interviews would have provided more in-depth information to expand upon the survey data. For example, knowing more specific information about the types of academic journals, websites, and books the teachers reference would have provided salient information about their possible interactions with research.

Conclusion

The findings of this study suggest that boundaries may exist between educational practice and neuroscience research at Sunnyville. A salient finding in the study was the

minimal use of academic journals by practitioners when making educational decisions. The factors contributing to practitioners' use of academic journals will need to be explored further in future research. Future researchers should also examine possible interventions to encourage boundary crossing at the institutional, interpersonal, and intrapersonal levels in order to improve interactions between the educational research community and practitioners.

Chapter 3: Possible Interventions for Improving the Mobilization of Knowledge Between Educational Researchers and Practitioners

The boundary between educational research and practice has come to the forefront because various stakeholders have called for the increased use of research to inform practice (Dagenais et al., 2012; Penuel, Allen, Coburn, & Farrell, 2015). Despite many attempts to translate research into practice, however, scholars have described the education field as impermeable to research (Ansari et al., 2011; Caine & Caine, 1998; Hille, 2011) and argued that current dissemination practices are insufficient for affecting change (Goldenberg & Gallimore, 1991). Aspects of this research based knowledge about challenges to boundary crossing were corroborated through a survey-based investigation conducted at Sunnyville Elementary School.

The survey revealed that teachers at Sunnyville acquire information from a plethora of sources to inform their practice. To assess the most utilized sources, teachers (n=15) were provided with a checklist of possible resources and a correlating open-ended response question. When analyzing the information, there were some discrepancies between the prevalence of the sources that the teachers use revealed by each question. Using the checklist format, teachers indicated that professional development outside Sunnyville (10%), professional development provided by the school (10%), education websites (10%), the curriculum (9%), their colleagues (9%), and books (9%) were selected most frequently. The open-ended question asked which sources they used the most to inform their practice. The teachers reported the curriculum (24%), colleagues (22%), and professional development outside of school (15%) to be the most salient. Results from both questions do indicate that the curriculum, their colleagues, and professional development outside of the school appears to be the most utilized sources by

the Sunnyville teachers. The results also revealed that while postsecondary education (7%) and academic journals (4%) were amongst the sources least selected by teachers on the checklist, none of the respondents identified those sources in the open-ended question as being utilized the most. This illustrates that teachers at Sunnyville use academic journals minimally in their context, despite it being the most prevalent format for scholars to report research findings. It is unclear whether accessing academic journals more could have an impact on the respondents' practice. Although the practitioners could have acquired research based information from other sources indicated on the survey, these findings may suggest a boundary exists between the format scholars are most apt to share research knowledge and the formats practitioners use to inform their practice. As such, it might be fruitful to aid practitioners in crossing that boundary in order to increase their interactions with primary research knowledge.

Previous Attempts to Cross the Boundary

Numerous models have been used in the past in an attempt to increase the influence of research on education, including analyzing different types of dissemination that can facilitate boundary crossing. Landry, Amara, and Lamari, (2001) summarized these as four models that have been suggested to improve practitioners' utilization of research knowledge: the science push model, the dissemination model, the demand-pull model and the interaction model. The science push model focuses on the transfer of research knowledge to practitioners. The dissemination model expands upon the science push model by putting mechanisms in place that will increase the potential users' awareness of the research. Both of these models situate the researchers as the source of relevant knowledge and the practitioners as receivers. Gore and Gitlin (2004) described the underlying power relations of such practices where teachers are to use educational

research produced by those who are viewed as more knowledgeable. These models also place the onus for the lack of knowledge-sharing on the teachers for not finding and using research (Cochran-Smith & Lytle, 1990). In addition, the dissemination of knowledge to practitioners does not ensure its application. Practitioners often question the reliability of the research, as conditions under which it was gathered may vary from their context (Kennedy, 1997; Levin et al., 2011). In addition, practitioners are often the objects of the researcher's investigations, and they are asked to implement the findings without the representation of their perspective (Kennedy, 1997). The implicit messages that have accompanied knowledge transfer, dissemination, and production practices have served as boundaries that impede practitioner-researcher interactions.

The demand-pull model, aimed to remedy the aforementioned difficulties by shifting the focus from the knowledge producer to the consumer. In this model, practitioners identify the research problem and the researchers attend more to the needs of the users than their desires to advance the academic knowledge base (Landry et al., 2001). Landry et al. explained further that this model shifts the power to the user during the problem development stage of research but fails to sustain interactions between practitioners and researchers during the possible application of the findings in educational contexts. To account for such shortcomings in the demand-pull model, the interaction model was created to better acknowledge the importance the complex practitioner-researcher interactions that must occur to promote the utilization and production of applicable educational knowledge. This model recognizes supposes that prolonged interactions between educators and researchers will increase the utilization of research and aims to recognize the importance of including the voices of the teachers as they

interpret information to improve their practice (Cochran-Smith & Lytle, 1990). The ideals of this model have informed a new field that focuses on how to improve how knowledge is mobilized in education.

Knowledge Mobilization: A New Approach

Scholars have advanced their thinking beyond the uni-directional movement of knowledge from research to practice towards a multidirectional knowledge-sharing approach. This multidirectional approach is the foundation upon which the field of knowledge mobilization was built (Sa´, Li, & Faubert, 2010). The field of knowledge mobilization is dedicated to the discovery of new strategies and relationships that can overcome the complexities that exist in moving information from research to policy and practice (Levin et al., 2011; Sa´, et al., 2010).

Ideas defining knowledge mobilization have evolved along with the terms used to describe the concept. When studying knowledge mobilization there are many terms that have been used such as dissemination, knowledge translation, knowledge transfer, knowledge exchange, and knowledge interaction to describe the movement of knowledge between research and practice (Cooper, Levin, & Campbell, 2009). The term knowledge mobilization has been widely used by scholars to effectively reflect the multidirectional nature of knowledge-sharing that is not just a means of moving knowledge from those who have it to those who do not (Cooper et al., 2009; Sa´ et al., 2010). Knowledge mobilization values practitioner knowledge and the knowledge of other relevant stakeholders in this multidirectional approach. Levin (2013) described how the desire to better connect research to practice has been a topic of scholarship dating back to the 16th century. Scholars have begun to conduct some empirical studies to provide insight into the facets of knowledge mobilization throughout various educational levels and contexts.

In one such study, Sa´ et al. (2010) examined the extent to which universities are participating in knowledge mobilization efforts. This study involved 12 research-intensive schools of education from around the world and vast majority of the participating universities were from the United States and Canada. The authors conducted semi-structured telephone interviews with 13 senior administrators. Sa´ et al. explains that the majority of the participants reported that knowledge mobilization was a focus of their institution and that it contributed to or was part of their school's mission. The authors also reported, however, that only a few of the participating universities had created supports at the institutional level to improve knowledge mobilization efforts. This may illustrate that universities have not fully committed to knowledge mobilization efforts that may disturb some long established academic structures. Sa´ et al. further described how some of the universities, that did have supports in place, mentioned how structures were created in response to the influence and financial support of government agencies who aim to improve knowledge mobilization. The study detailed how many of the participants described future efforts to improve knowledge mobilization which included providing more institutional supports, improving the perceived value of this work with their faculty, and cultivating research topics that were more relevant to practitioners.

A major barrier discussed by the administrators in the study was the need to improve faculty attitudes in regards to knowledge mobilization. The study illustrates how some faculties do not value the dissemination of their research to lay audiences as most academic incentives are skewed towards favoring academic publication. The authors described how some faculty have expressed a desire for compensation for the extra time

devoted to knowledge mobilization activities such as re-writing articles in a way that is accessible to people outside of their field, consulting, and answering media requests. Sa´ et al. (2010) explained how this can all be viewed as distractions from the faculty's research and advancement goals. It is interesting to note that many of the knowledge mobilization strategies described by the participants largely encompassed ideas of dissemination and did not address finding avenues for collaboration with practitioners to learn from their knowledge. Sa´ et al. described the many boundaries that must be crossed to improve knowledge mobilization efforts at the university level. The study also aligns with the previous literature findings, in that education organizations lack the capacity to support knowledge mobilization (Levin et al., 2011).

Even if knowledge could be more efficiently mobilized in the education field, there is unclear evidence that positive effects would occur. Professionals in the medical, social work, and technology fields have all worked to improve the relationship between research and practice. Cooper et al. (2009) asserted that social policy decisions based upon research instead of custom or ideology produce better results. These authors provided many examples throughout history, such as the use of citrus fruits to prevent scurvy or the documenting the importance of washing hands to prevent the spread of infection, as evidence to the ways in which research largely improves practice. It is important for stakeholders to begin to cross the boundaries between education research and practice to see what changes new knowledge can bring. As such, the researcher will evaluate several interventions in this chapter in order to support knowledge mobilization as a way to promote boundary crossing between education research and practice.

Interventions that Promote Boundary crossing

Researchers have described the boundary construct as creating barriers to knowledge mobilization; however, it has also taken on the characterization of a third space that provides a platform for interaction between stakeholders (Sinnema, Sewell, & Milligan, 2011). Thus, while boundaries can contain mechanisms that prevent the mobilization of knowledge, they also have the potential to be platforms for knowledge-sharing as stakeholders move across the boundary. While boundaries often are considered to be a means of separation, in this literature review, the researcher will outline various interventions that have the potential to transform this ambiguous middle ground into a platform for collaboration, innovation, and learning as some (Akkerman & Bakker, 2011) have described it. This unclaimed space contains opportunities for those who are willing to cross the boundary. Although these interventions have been suggested or attempted, they have failed to make significant changes that would support knowledge mobilization among researchers and practitioners on a large scale. In this section, the strengths and weaknesses of each intervention will be analyzed to provide merit for the suggested Inquiry Team intervention model.

To improve knowledge mobilization within and between institutions, scholars have discussed the need for the field of education to utilize systems that promote boundary crossing. Jackson (2006) compared the management of knowledge in education with the medical and high-tech industries. In most measures, the high-tech industry has a high level of knowledge management, the medical field has a mostly medium, and the education field is quite low. Some of these measures include: awareness of knowledge management, cross-specialization collaboration, internal networking, external networking, and links with universities. The education field may be able to adopt the

knowledge mobilization approaches modeled in other industries. Jackson asserted that this can be realized through the creation of knowledge networks.

Networks

Creating networks in education is viewed as a possible system for promoting boundary crossing. Networks are defined as "locations in which specialized knowledge can be created and transferred within collaborative team contexts" (Jackson, 2006, p. 275). Jackson described how networks can be fostered within schools, between schools, and between networks. The author attested that networks counter the traditional education structures that often foster the isolation of schools and practitioners. Other scholars have also explained how networks can support collaboration, innovation, and knowledge mobilization amongst stakeholders (Akkerman & Bruining, 2016; Briscoe, Pollock, Campbell, & Harris, 2016).

Briscoe et al. (2016) conducted a study to analyze the Knowledge Network for Applied Education Research (KNAER), which was a governmental initiative in Canada to support research-based decision-making in schools. Forty-four projects were funded by the KNAER initiative; however, only 21 people from 19 of the project cites participated in interviews. Face-to-face interviews, web conferences, phone interviews, and written responses were recorded and transcribed for analysis. In addition, a document analysis of knowledge mobilization plans, interim reports, and final project reports generated by the participants were conducted to provide more insight into the complexities of knowledge mobilization networks. Two hundred twenty-eight documents were analyzed in this study and the data was further coded into categories and subcategories relating to network structure and process. On a structural level, the authors found successful networks to contain the following components: similar goals and objectives to current governmental

priorities, inclusion of key people and organizations, formal roles and responsibilities, and organizational methods of communication. The authors described how networks with goals closely aligned with the government could clearly communicate their objectives to their partners, which lead to an increased influence.

The authors also discovered the value of high quality partnerships over the number of collaborations a network sustained with various organizational or individual partners (Briscoe et al., 2016). Significant partnerships supported a network to achieve community goals or informed decision-making. Formal leadership roles were also influential in the success of the networks. Formalized roles enable the delegation of responsibilities to efficiently achieve goals, as networks are comprised of many participants and partnerships. Lastly, formal communication structures were essential in relaying information to network participants. The authors described how networks that lacked a clear plan for communication experienced difficulties in knowledge-sharing. While the results of this study provided some insight into structural changes needed to support successful knowledge mobilization networks in education, there are some limitations. The authors failed to define a successful network and their ties to the KNAER project impacts the credibility of the findings. With such a small amount of empirical studies of educational networks, the information gleaned from the Briscoe et al. (2016) study does provide some insight into possible factors influencing the success of establishing educational networks.

Networks can analyze knowledge mobilization between organizations, known as *external networking* (Jackson, 2006); within organizations, known as *internal networking* (Gainforth et al., 2015; Jackson, 2006); and social interactions, known as *social*

networking (Briscoe et al., 2016). This macro-level analysis can provide insight into the structural barriers or conduits of knowledge mobilization within a specified organizational context. Network analysis can be conducted to investigate knowledge mobilization at the structural level.

Empirical data can be analyzed from a network perspective to provide insight into patterns of interpersonal communication, group structures, and knowledge mobilization (Gainforth et al., 2015). One such network analysis used survey data from 79% of employees at one community-based organization (Gainsforth et al., 2015). Visual representations of the social networking data were created to analyze the proximity of each participant to one another and to identify network ties or reported interactions. Data were used to identify participants who are active in the social network, are on the periphery, and/or who engage in reciprocated knowledge-sharing. The authors asserted that this provides insight into how knowledge flows within an organization, which can inform recommendations for improving communication. This type of analysis would be most valuable if the communication between the participants is mobilizing knowledge. The assumption cannot be made that any interactions or communications between stakeholders fosters knowledge mobilization. The questionnaires used in network analysis, therefore, must gather information about the content being communicated. The extent network analysis can be used to provide information about knowledge mobilization in the education field has yet to be adequately studied; however, this does illustrate a possible mechanism for assessing the communication habits of actors in a specific organization.

Finnigan, Daly, and Che (2013) used a network analysis to assess how information from research was being accessed, utilized, and diffused in a midsized low performing urban district. The authors enacted an exploratory case study that utilized survey and interview data to analyze the use of research evidence and how such information is mobilized. Data analysis using SPSS and UCINET indicated the schools had a highly centralized structure that depended on the principals providing access to knowledge. The central office leaders of the district did discuss research but ties between the central office and the principals were weak, indicating the unlikely transfer of information. Although the network analysis in the study did provide some information regarding the organizational structure of the school, it is unclear whether such information could have been attained through observation or described by stakeholders in the context. This study is an example of how network analysis can provide information about educational organizational structures that promote or inhibit knowledge-sharing.

A central tenant of educational networks is the idea that collaboration is an important component in fostering knowledge mobilization. Scholars have identified and described mechanisms for fostering collaboration amongst numerous stakeholders. In the context of education, this could include interactions amongst researchers, teachers, student interns, administrators and community members. This collaboration may happen organically or intentionally through the installation of specific programs or through the actions of individuals. When considering the gap between research and educational practice, many scholars have suggested the use of the translational research model as a potential framework for improving knowledge mobilization between the two fields.

Translational Research Model

The translational research model is applied to the medical research infrastructure to promote the translation of basic research findings to inform clinical practice; also known as a "bench-to-bedside" model (Callard, Rose, & Wykes, 2011; Woolf, 2008). Levels within the translational model are used to describe how knowledge is transferred from research to practice. Translational research level one (T1) aims to translate information from basic laboratory research to new improve diagnosis, prevention, and the findings first application to human subjects (Callard et al., 2011; Woolf, 2008). At the T2 level, scientists apply the information gained from T1 research to clinical settings (Callard et al., 2011; Woolf, 2008). Woolf further explained the differences in types, as T1 works to overcome barriers with biological and technical mysteries such as trial recruitment and regulatory concerns. In contrast, T2 focuses on human behavior and organizational inertia, infrastructure and resource constraints, and proving an intervention's effectiveness under various conditions. Education and medicine are similar, as the impact of an intervention can be largely dependent upon environmental context and numerous other factors, which makes T2 research salient. Some scholars have expanded the model to add T3 research which focuses on moving evidence based guidelines into heath practice (Callard et al., 2011; Woolf, 2008). Callard et al. (2011) further described another phase of translational research, T4, in which scientists aim to assess the impact of health practices on larger populations through outcome research.

The translational model's ability to streamline the movement of knowledge from research to practice has undergone scrutiny as some look to improve or disprove the model's effectiveness. Woolf (2009) described funding disparities that exist between T1 and T2 research, as T1 research receives more funding. Callard et al. (2011) critiqued this

model for not emphasizing the valued input patients and the public can have on the earlier phases. These authors asserted that the current model characterizes service users as recipients of knowledge instead of potential contributors and collaborators. This critique aligns with scholars who have advocated for improved knowledge mobilization strategies that are multidirectional and increase involvement from a number of stakeholders. Although Woolf (2009) described the National Institutes of Health's (NIH) efforts to make the adoption of this research model a priority within the medical field, there is still much to learn about this model's effectiveness in the medical field and potential application to education.

Scholars have started to apply some of the concepts from the translational research model to educational contexts. On an international level, educational leaders in the United Kingdom are using translational research through the creation of a series of Mapping Education Specialist knowHow (MESH) guides (Overden-Hope & la Velle, 2015). Overden-Hope and la Velle explained that the MESH guides are a free online database of interactive maps of subject-specific content areas that can be accessed by anyone worldwide. The authors further described that each map documents both existing evidence, knowledge gaps, and points of contention for each subject. Each MESH guide is peer-reviewed, and any educator can comment on their content (Overden-Hope & la Valle, 2015). This creates a platform for potential bidirectional communication between practitioners and scholars.

To evaluate primary teachers' use of MESH guides, Overden-Hope and la Velle (2015) focused their work on the use of one in the area of spelling. In this study, the teachers were not trained in MESH guides; they were only told about it by their head

teacher at the beginning of the school year and were encouraged to use the resource for curriculum planning. Ninety-seven teachers from 120 schools responded to an online survey at the end of the year. The results displayed that only 5.2% of the respondents had accessed MESH guides. Many of the teachers communicated that they did not know about the guides and even if they would have known, they felt as if their schools already provided the curricular resources they need. For the teachers that did access the guides, 66.7% used the maps to inform their curriculum/planning and reported an increase in their students' learning. The results of this case study illustrate how providing resources does not guarantee participation. It serves as a cautionary study for translational research architects who may need to address the importance of visibility and context level supports to aid teachers in using such resources. Although some scholars have suggested a translational research model as a way of bridging the gap between research and practice, there are still many aspects of the model that are unknown. The medical field is still defining, refining, and assessing the impact of the application of the model in various contexts. There is even less empirical knowledge about this model's possible application within the education field.

The creation of MESH guides and online resources for teachers is a passive approach to bridging the gap between research and knowledge. Like MESH guides, other efforts have been taken to provide platforms for educators to easily access research. Cain (2015) described the creation organizations, conferences, and websites with the intent to connect practitioners to education research that can be used to inform their decision-making. Additionally, the author outlined the implementation of open access policies and the requirement of researchers to include impact agendas with their research submissions.

As illustrated in the aforementioned study, the creation of such resources is not a guarantee of their use. Some scholars have discussed the need for more intentional work to be carried out by a third party to close the gap.

Knowledge Broker

Many scholars studying knowledge mobilization have described the role of a third party to provide structures and support that can help bridge the gap between research and policy or practice (Bultitude et al., 2012; Cooper et al., 2009; Levin, 2004). These third-party organizations or individuals are often referred to as knowledge brokers (Bultitude et al., 2012; Cooper et al., 2009). In the literature, knowledge brokers are described using terms such as knowledge influencers, intermediary organizations, boundary workers, boundary crossers, or boundary spanners (Anwaruddin, 2015; Goodyear & Casey, 2015; Hargadon, 2002; Mayer, Grenier, Warhol, & Donaldson, 2013; Reid, 2014). Knowledge brokers can come in many forms, including the media, politicians, think tanks, foundations, and professional organizations (Cooper et al., 2009; Levin, 2004). These professionals inhabit the boundary space, which can have both positive and negative implications. Crossing boundaries can provide knowledge brokers with the opportunity to refine and improve the mediating process (Bultitude et al., 2012). As third parties, they have the ability to maintain an impartial perspective while providing insight into how to best foster collaboration between educators and researchers (Bultitude et al., 2012). Knowledge brokers also can alleviate the stress from organizations who desire to disseminate information but who do not have the resources to do so (Cooper et al., 2009). They can aim to meet the needs of multiple stakeholders while continuing to develop structures and supports that improve interactions (Bultitude et al., 2012). Akkerman and Bruining (2016) described the risk of never being acknowledged or accepted by any one

organization as a negative aspect of the role. Conversely, the authors explained how power is sometimes associated with being a link between multiple knowledge sources and with having the fortitude to inhabit such an innovative role. The complexities of inhabiting the knowledge broker position are beginning to be explored by scholars.

Knowledge brokering requires embracing multiple duties. The primary responsibility of a knowledge broker is to connect actors or act is bridges between organizations (Akkerman & Bruining, 2016; Hagadon, 2002; Mayer et al., 2013). It is important also for knowledge brokers to identify the prior knowledge held by each individual in order to provide an opportunity for appropriate knowledge to be shared and built upon (Hagdon, 2002). Trust is often cited as an important component in a knowledge broker's ability to incite participation from several stakeholders (Kalkan, 2016; Mayer et al., 2013; Reid, 2014). Once trust is established and the participants feel that they can collaborate, the knowledge broker must analyze the multiple perspectives presented (Akkerman & Bruining, 2016; Reid, 2014). Mayer et al. (2013) expanded upon this notion to include the idea that knowledge brokers cannot make decisions based upon any preconceived ideas about participants, conform to previously established power relationships, or grasp onto mental models of what education is. While the knowledge brokers can have some control over the aforementioned characteristics of their facilitation, they can still be limited by contextual factors they do not have the authority to change. In schools, some examples of these contextual factors include scheduling structures, educational policies, and established leadership hierarchies.

Hagadon (2002) studied eight knowledge brokering firms from various industries. The author analyzed firms from industries such as engineering, manufacturing,

consulting, and technology. The author asserted that such analysis provides insight into the relationship between research and learning. With the breadth of representation, these findings can inform the knowledge mobilization field as a whole and offers some lessons even to education although this sector was not included in the study. The author explains how the organizations studied regularly transform their prior knowledge and experiences into new innovative products, processes, and services. Hagadon described the value of reimagining existing resources as an innovative practice because knowledge is often fragmented into specific domains. Knowledge brokers have the ability to transcend these domains to expose existing knowledge for its innovative use in new contexts. Much like the assertion of Mayer et al. (2013) that knowledge brokers must move beyond preconceived ideas and mental models, Hagadon (2002) explained that they must overcome the cognitive constraints that exist about the domain from which knowledge comes, to reimagine its use in a new context. As the potential initiator and facilitator of knowledge mobilization scholars have begun to investigate who can inhabit such a role.

Individuals from various backgrounds can occupy the role of knowledge broker. Knowledge brokers can be teachers, administrators, researchers, and education students (Hynie, Jensen, Jonny, Wedlock, & Phipps, 2011; Mayer et al., 2013; Nichols, Phipps, & Johnstone, 2014; Penuel et al., 2015; Reid, 2014). Hynie et al. (2011) conducted a study to investigate the role student internships could have as a potential conduit for knowledge brokering. The authors reported a reciprocal experience where the research the students conducted positively impacted the partnering organizations, and the students learned more about applying research in practice. Mayer et al. (2013) studied the role of past school leaders as external coaches. These individuals were employed from an

intermediary organization to work with principals and teachers to improve instruction and learning. While knowledge brokers can come from diverse backgrounds and can inhabit many roles, Anwaruddin (2015) disagreed that this position is necessary to promote knowledge mobilization between stakeholders. This author viewed the knowledge broker's role as the interjection of one more expert who intends to mediate the interactions of teachers with research by choosing, summarizing, and conveying the research findings to the teachers. Instead, the author asserted that teachers need to be given opportunities to access and utilize research directly and that knowledge can be shared through collaboration amongst a community of learners.

Research Practice Partnerships

Much of the work around creating collaborative experiences in education focuses on cultivating successful partnerships between researchers and practitioners. Coburn, Penuel, and Geil (2013) defined research practice partnerships as long-term collaborations between researchers and practitioners to investigate problems and possible solutions. Abodeeb-Gentile et al. (2016) described a study involving collaboration between the Early Literacy Lab School (ELLS) and a local university. This qualitative study was conducted over a 2-year period to improve professional development at the school and to document the collaboration between some university faculty and the teachers. The collaboration included the stakeholders' participation in data team meetings, professional development (PD), and professional learning communities (PLC). In addition, the researchers spent time modeling strategies in the teachers' classrooms and the lessons were recorded for school wide professional development. The researchers used the Connecticut Mastery Tests to document a 57% increase in the number of students meeting literacy standards in a 1-year timeframe. In addition, the authors also

credit the teachers in forming a PLC and creating more content focused PD as positive changes for the school due to the collaboration. The researchers did not discuss whether the university faculty were impacted in any way and whether knowledge from the practitioners was used to influence their research. In this instance, the researchers focused on detailing the partnership but do not discuss aspects of knowledge mobilization. For example, the type of information and the mechanism for sharing it with the teachers was not thoroughly discussed. Although the authors in this study reported positive outcomes from research-practitioner partnerships, other scholars have documented difficulties.

Carr and Bradley-Levine (2016) detailed a collaborative partnership between a university affiliated research center and the Catholic diocese in a large Midwestern city. The researchers were asked to assist the diocese in evaluating an after-school program aimed to meet the students' academic needs. The research team members worked to remove any barriers to communication by engaging often with the staff and program director to foster a research relationship. Carr and Bradly-Levine described their efforts to create a partnership based upon shared trust that would enable both the researchers and the program's staff to address issues as they arise. Challenges included sharing data, maintaining appropriate confidentiality, and developing balanced relationships with all of the program's staff. The researchers regretted their communication being mainly with the program director and site directors who shared the data with the staff. The authors asserted that creating opportunities for collaborative interpretation of the data with the site directors and staff would have led to the development of a collaborative report. Both Abodeeb-Gentile et al. (2016) and Carr and Bradley-Levine (2016) illustrated the difficulties in forming research-practitioner partnerships that create open lines of

communication for improved knowledge-sharing. Although both sets of researchers aimed to foster bidirectional research relationships, they did not describe the ways in which the research team was influenced by the knowledge of the practitioners. Additionally, the research practice partnership model failed to address the challenges inherent ensuring each school can have a researcher to partner with. It is clear that there will be many barriers to developing successful research collaborations that can be generalized throughout the entire field.

Communities of Practice

The concept of communities of practice (CoP) is largely defined and explored through the scholarship of Wenger (2011), who defined communities of practice as "groups of people who share a concern or passion for something they do and learn how to do it better as they interact regularly" (p. 1). This community of learners can come together either formally or informally. Although establishing this community may erect new boundaries, Wenger (2010) described the boundaries of a CoP as fluid because they arise through engagement with various people or organizations with diverse backgrounds and experiences. Additionally, CoPs are not a new organization or division within the organization; rather, they are a different aspect of the organizational structure that prioritizes learning.

Brouwer, Brekelman, Nieuwenhuis, and Simons (2012) conducted a mixed methods study to analyze the extent to which seven teacher teams demonstrated mutual engagement, shared repertoire, and joint enterprise—the dimensions of a CoP, as defined by Wenger (1998). In the study, teacher teams are comprised of teachers from one grade level and learning domain. In addition, a team leader was appointed by the school's administration to chair the meetings that occur twice per week, and a questionnaire was

provided to 72 teachers at a secondary school in the Netherlands. Mutual engagement was assessed through six questions relating to the group's identity. Three items that pertained to shared interactional repertoire were used to assess shared repertoire. Lastly, six items measured joint enterprise by assessing a shared domain. In addition to the questionnaire, video observations of the teams were performed. Both the quantitative and qualitative results supported that the teacher teams' degree of mutual engagement, shared repertoire, and joint enterprise were moderate. The authors reported that many superficial engagements occurred when schedules and field trips were discussed. Deeper discussions about educational visions and beliefs were not entertained.

Similarly, Meirink, Imants, Meijer, and Verloop (2010) studied five interdisciplinary teams at the secondary school level. Observation data was collected and analyzed into four types of collegiality/collaboration. *Story-telling and scanning* was one type of interaction where the teachers exchanged experiences about individual problems with students or classes during the meetings. The label of *aid and assistance* was given to interactions where teachers exchanged their experiences, critically examined them and provided their colleagues with feedback. Teams in which teachers exchanges experiences, ideas, and methods were included in the *sharing* category. Finally, teams that focused on shared problem solving, planning, and innovation engaged in *joint work*. At the conclusion of the data analysis, the researchers determined that all five teams engaged in *sharing*. The sharing category is similar to the surface level interactions described in Brouwer et al. (2012) in its focus on existing practices and organizational problems instead of creating innovative alternatives. Wenger's (1998) assertion that CoPs are a platform where knowledge is created, shared, organized, revised, and passed on

within and amongst communities may be dependent on the participants and the processes of collaboration they engage in. These studies counter the argument made by Anwaruddin (2015), who suggested that knowledge brokers are not needed as teachers could learn from research in collaborative communities. These researchers illustrated that teachers' collaborations may not result in joint work and can be largely superficial. The task of accessing, reading, analyzing, and applying research knowledge are tasks that require a level of depth among practitioner interactions that was not reported in these studies. Blankenship and Ruona (2007) also reported problems that are associated with a CoP, including: hoarding knowledge, clique formation, limited innovation, and membership exclusivity. Some of these drawbacks may have contributed to the creation of professional learning communities as another form of social learning.

Professional Learning Communities

Unlike CoPs, professional learning communities (PLCs) are conduits of social learning that are specific to the field of education. PLCs are comprised of characteristics that have been slightly altered by numerous scholars. The following characteristics of a PLC were found to be common amongst the sources referenced for this review. Many scholars have discussed the need for a PLC to have a shared vision or mission (Blankenship & Ruona, 2007; Kalkan, 2016; Vescio, Ross, & Adams, 2008). Essentially, the group of teachers must decide the purpose for their collaboration. The second characteristic is a focus on teaching and learning (Giles & Hargreaves, 2006; Kalkan, 2016; Vescio et al., 2008). Some scholars relate learning to the learning that occurs amongst the participants (Blankenship & Ruona, 2007; Kalkan, 2016). Others relate it to a focus on students learning (Giles & Hargreaves, 2006; Vescio et al., 2008). The final characteristic pertains to conducting collaborative work to inform the participants'

actions (Blankenship & Ruona, 2007; Kalkan, 2016). PLCs can also have limitations similar to CoPs, such as superficial collaborations (Giles & Hargreaves, 2006). In addition, scholars have raised concerns about the possibility for PLCs to limit the teachers thinking if other perspectives from those outside of the education community are not considered (Giles & Hargreaves, 2006; Vescio et al., 2008). Although PLCs have been suggested by scholars as a mechanism for boundary crossing, like CoPs, this illustrates the danger in assuming that collaboration automatically leads to innovation or knowledge mobilization. Even if innovation is part of the school's or PLC's mission, Giles and Hargreaves (2006) illustrated that those measures may not be able to sustain change in the face of societal pressures for conformity.

Giles and Hargreaves (2006) conducted a case study of three innovative secondary schools in Ontario, Canada and New York State. Data were collected using semi-structured interviews with a random sample of retired and active teachers and administrators representing cohorts from the 1970s, 1980s, and 1990s. Ethnographic data were also obtained from school visits, faculty meetings, students, state officials, and from school, district, and stat/provincial documents. The innovative life histories of all their schools were informed by the triangulated, coded, and thematically organized data. The three schools of Lord Byron, Durant, and Blue Mountain responded to increases in standardization measures in different ways.

The enthusiasm of the founding principal and the early creative teachers at Lord Byron were not enough to sustain the school's innovation throughout times of adversity (Giles & Hargreaves, 2006). As the school evolved thorough changes in faculty and class size, the program and innovative culture was not sustained. In the end, the increased

centralization and standardization of the educational agenda undermined the school's unique sense of autonomy and creativity. In Durant, the school was able to resist the impact of accountability reform efforts due to its small size and stable faculty and leadership. In addition, when Durant was met with adversity they were able to cross boundaries to network with other schools and advocate jointly. Even with Durant's networking and activism, it still fell victim to the expectations of standardized reform. Lastly, Blue Mountain was able to rely on its own identity as a learning organization to withstand the pressures of standardization. The school's ability to involve the community early, plan ahead for leadership successions, and by establishing process teams and multiple PLCs demonstrated resilience. Unfortunately, the school was beginning to succumb to external forces that threaten their innovative identity. Commitment to the pioneers' vision from the leadership and new faculty was wavering as shame and blame have tarnished the once highly collaborative environment. The authors asserted that Blue Mountain's ability to maintain its culture of learning will be increasingly difficult. They describe how for innovative schools to maintain their identities, they will have to designate a space in their organizations for learning. The authors suggested that the study indicates that the establishment of PLCs alone will not be able to sustain knowledge-sharing, and governments will have to curb standardization efforts (Giles & Hargreaves, 2006).

Giles and Hargreaves (2006) explained that the ability for schools to incite or sustain innovation and knowledge mobilization is the result of many factors. While PLCs may have aided each of the schools to some degree in maintaining their own culture of learning and desire for innovation, there was not much transfer into the larger educational

field or education policy realm. This is an important finding in considering interventions for knowledge mobilization, as it indicates how the mechanisms for social learning such as PLCs and CoPs may not be enough to foster enduring change. Perhaps collaborative inquiry provides a framework for cultivating innovation and knowledge mobilization.

Collaborative Inquiry

Collaborative inquiry offers practitioners the opportunity to "work together to identify common challenges, analyze relevant data, and test out instructional approaches" (David, 2008). When teachers engage in collaborative inquiry they are conducting research in their own professional contexts (Cantalini-Williams et al., 2016; David, 2008). In order for teachers to engage in collaborative inquiry, they must be open to changes in their identity formation to include that of a researcher. Huffman and Kalnin (2003) collected data on eight teams of four to eight educators from across the state of Minnesota. The teams participated in workshops that were created to assist them in engaging in inquiry at their respective schools. Elementary, middle school, and high school math and science teachers, principals, superintendents, curriculum and assessment coordinators, students, and school board members participated in the teams. The workshop helped participants to engage in an inquiry cycle established by the seminar creators. The seminar began with the teams analyzing Minnesota's results on the Third International Mathematics and Science Study (TIMSS). From there, participants engaged in connecting the data to their own contexts and then created inquiry questions that were used to guide their research. Throughout the following year, the teams returned periodically to analyze their data and to devise action plans. The action plans cultivated a continuous dialogue around monitoring, data collection, and analysis.

At the end of the study, a survey was given to the participants about their experience in the project. Twenty-nine of the 42 participants completed the survey. The survey results revealed an increased collaboration with colleagues (100%), an improved ability to conduct research (over 60%) and it improved the curriculum, instruction, and the school district generally (over 80%). Over 95% of the participants believe the process enabled them to make data driven decisions and engage in a process of continuous improvement. Some of these findings are in alignment with the results of the Cantalini-Williams et al. (2016) study on collaborative inquiry. These authors also discovered collaboration to be a valued experience by teachers and an increase in research awareness. Both researchers' conclusions provided participants with opportunities for collaboration and information about conducting research, which, based upon the results, appear to be important components to inciting a collaborative inquiry program.

Huffman and Kalnin (2003) also conducted a focus group of nine participants to provide more in-depth data analysis. The focus group reported that their participation in the collaborative inquiry process strengthened their feelings of professionalism, heightened their professional standing, and improved their leadership skills. A change in identity was reflected in their expressions of how participating in research led teachers to conduct activities that did not align with their current job descriptions or ran counter to the school's structure. This finding reflects their struggle with identifying the characteristics their new hybrid role as teacher researchers. Cantalini-Williams et al. (2016) found that teachers who participated in their collaborative inquiry experience also had changes in their identity that not only impacted them but their students. In this study, when teachers adopted the role of researcher as part of their identity, participants began

to create a culture of inquiry within their own classrooms. The students also began to take interest in the research the teachers were conducting. Both studies indicated that collaborative inquiry can lead to changes in teachers' identity formation and professionalism, whose effects have the potential to extend beyond them as individuals.

In addition to the positive outcomes of the study, there were some important complications noted. In the Huffman and Kalnin (2003) study, some participants reported how finding the time to do research and teach was difficult. A need for more time for collaboration and research was consistent with the literature (Butler & Schnellert, 2012; Cantalini-Williams et al., 2016). Huffman and Kalnin (2003) also unearthed another concern, which was how the teachers were going to carry on their research work once the seminars ended. The authors explained how one team reported their concerns with not having the authority in their own school to keep the collaborative inquiry project going. In these studies, the participants crossed boundaries to interact with other professionals outside of their immediate school and experienced changes in their professional identity; however, the current educational structures are barriers to their ability to continue their research. Table 4 displays the interventions and the extent to which they promote multilevel boundary crossing.

Table 4

Comparison of Interventions' Focus on Promoting Multilevel Boundary crossing at the Institutional, Interpersonal, and/or Intrapersonal Levels.

Intervention	Description	Institutional	Interpersonal	Intrapersonal
Networks	"Locations in which specialized knowledge can be created and transferred within collaborative team contexts" (Jackson, 2006, p.275). Networks can be fostered within schools, between schools, and between networks.	X	X	
Translational Research Model	A medical research infrastructure to promote the translation of basic research findings to inform clinical practice; also known as a "bench-to-bedside" model (Callard et al., 2011)	X		
Knowledge Broker	Third parties who have the ability to maintain an impartial perspective while providing insight into how to best foster collaboration between educators and researchers (Bultitude et al., 2012).	X	X	
Research Practice Partnerships	Long-term collaborations between researchers and practitioners to investigate problems and possible solutions (Coburn et al., 2013)	X	X	
Communities of Practice	"Groups of people who share a concern or passion for something they do and learn how to do it better	X	X	

	as they interact regularly" (Wenger, 2011, p.1)		
Professional Learning Communities	Collaborations among educators that focus on teaching and learning (Giles & Hargreaves, 2006)	X	
Collaborative Inquiry	Practitioners "work together to identify common challenges, analyze relevant data, and test out instructional approaches" (David, 2008).	X	X

The Intervention

The task of crossing boundaries between long established educational structures can be arduous and success requires that the complexities of such an endeavor are deeply considered. To better grasp the complexities of boundary crossing, Akkerman and Bruining (2016) outlined a multilevel perspective to boundary crossing. This multilevel approach proposes that boundary crossing can occur at the institutional, interpersonal, and intrapersonal levels individually or simultaneously as described in detail in chapter one. If the relationship between research and practice is to really change, it will take an intervention that encourages boundary crossing on all of Akkerman and Bruining's levels. In the paragraphs that follow, the researcher will introduce and describe the current intervention at Sunnyville in relation to its intended ability to address boundary crossing at the institutional, interpersonal, and intrapersonal levels.

Institutional Level Boundary crossing

Boundary crossing at the institutional level initiates interactions between organizations or organizational units (Akkerman & Bruining, 2016). To facilitate the

crossing of boundaries, changes must be made to the current educational structure that separates research knowledge from practitioners' experiential knowledge. The current intervention strategically drew on three interventions used to impact knowledge mobilization on the institutional level: a knowledge broker, a CoP, and collaborative inquiry. While all of the interventions discussed throughout this piece have been suggested as possible mechanisms for improving knowledge mobilization between education researchers and practitioners, independently, they each fail to address all of the facets needed for sufficient and lasting organizational change. The suggested intervention, therefore, is a combination of a knowledge broker and a CoP whose participants engage in collaborative inquiry. The combination of these interventions is referred to as an Inquiry Team. The Inquiry Team begins making organizational changes with the establishment of the knowledge broker.

The knowledge broker will be charged with the task of creating the CoP (Goodyear & Casey, 2015), facilitating meetings, and connecting the participants with other important resources in the community (Mayer et al., 2013). These connections can be used to acquire more information or to share practitioner knowledge with the larger community. It will be important for the knowledge broker to encourage connections between the community members not participating in the Inquiry Team and the participants. This might include fostering engagement with researchers, administrators, and other practitioners so that boundaries will be crossed in order for knowledge to truly be mobilized. In other words, the knowledge broker must identify and provide opportunities for boundary crossing (Mayer et al., 2013; Penuel et al., 2015). In their study, Mayer et al. (2013) found that the coaches—who have a similar role to a

knowledge broker—aided in having a CoP reach their goals, allowed for dialogue, and acted as mediators and supporters There is a lack of literature in which scholars have adequately defined the role of knowledge broker in educational contexts; therefore, the knowledge broker will have to participate in some self-authorship in order construct their own belief system or standard in order to make meaning of themselves and their innovative work (Helsing, Howell, Kegan, & Lahey, 2008). While the knowledge broker does create and facilitate the CoP, a hierarchal structure is not intended to be established between the knowledge broker and the CoP participants. The role of the knowledge broker, therefore, was not held by an administrator, but was instead assumed by a faculty member.

Establishing a CoP creates another opportunity for organizational change. The CoP was selected for its ability to expand beyond the organization, which was in contrast to a PLC that is comprised of teachers in one context. It is not only important to cross boundaries within an organization, but also with other stakeholders outside of the school to encourage the multidirectional flow of knowledge. CoPs have a structure more conducive to supporting the mobilization of knowledge amongst multiple stakeholders. The purpose of the CoP component is to create a space for teachers to collaborate, innovate, and experiment with new ideas.

In another attempt to dissolve long-held hierarchal structures, the head of school did not take part in the innovation team meeting. The head of school was informed of the work of the Inquiry Team from the knowledge broker or other members of the team as distributed leadership has been recognized as an important component that supports teacher engagement (Butler, Schnellert & MacNeil, 2015). The Inquiry Team

intervention was designed to have little direct involvement from the head of school to ensure collaboration is not impacted by hierarchal structures. Creating a space that is emotionally safe is of importance to the intervention's success as Immordino-Yang and Damasio (2007) described the interrelationship between cognitive and emotional brain structures. Their study of patients with brain damage was used to support their assertion of the interconnectivity of a person's emotions and their cognitive ability. Participating in the CoP is a collaborative process that is cognitively stimulating, and the participants needed to feel emotionally safe to fully engage. Participants needed to feel free to express their deepest thoughts and feelings about a topic without the possibility for it to impact their position or their superior's view of them. In addition, participants may find participating in a new form of professional development, or collaborating with their colleagues to be stressful without the added pressure of having their administrator present.

As the facilitator, the knowledge broker needed to be cognizant of the participants' stress levels. Aamodt and Wang (2011) described the negative effects that ongoing stress can have on the brain, such as the creation and death of neurons, neural plasticity, executive functioning, the hippocampus, and structural changes in the amygdala. All of these processes and areas of the brain impact cognitive functioning, thus the ability to learn information. Sapolsky (2004) expanded upon the effects of stress on learning by describing how moderate levels of stress can actually have positive effects on memory but how severe stress can impede memory. Avalos (2011) reported that school cultures can either inhibit or support collaborative inquiry, therefore it will be imperative to create a culture that is emotionally safe, supports healthy stress levels, and is free from

hierarchical structures. Much of the culture can be cultivated by the knowledge broker as interpersonal interactions occur.

Interpersonal Level Boundary crossing

The interpersonal boundary crossing level creates opportunities for interaction between groups of people from different practices (Akkerman & Bruining, 2016). The Inquiry Team consisted of four to six educators that desire to cross boundaries to work with individuals outside of their classroom, grade, specialty area, or school. With the knowledge broker's assistance, the CoP participated in collaborative inquiry. Nelson, Slavit, Perkins, and Hathorn (2008) studied the experiences of 12 facilitators of collaborative inquiry experiences with secondary science and math teachers. The facilitators created a "steering committee" and also engaged in collaborative inquiry themselves. The authors described the experiences of the committee members in their narrative case study.

At the onset, the group created collaborative norms that helped them to develop a culture of inquiry and aided in the development of a high level of trust amongst participants. In addition, the members created a shared vision that was under continued reexamination and co-construction. Communication was also found to be of influence as when tensions arose it was often related to unclear or insufficient communication. Lastly, the authors indicated the importance of shared leadership as another salient component to the success of their collaborative inquiry experience. This finding also supported the current researcher's decision to not include the head of school in the Inquiry Team. The information from the Nelson et al. (2008) was used to provide structure to the collaborative inquiry process. The first few Inquiry Team meetings were used to establish norms for collaboration and communication. Establishing a culture of shared leadership

began immediately with the collaborative construction of a shared vision. This was intended to help create a group identity that has been identified as a necessary component in transformational learning at the interpersonal level (Akkerman & Bruining, 2016). Creating a culture of collaboration and continued learning amongst members of the Inquiry Team is paramount to the intervention's success.

The study of Meirink et al. (2010) involved a similar use of interdisciplinary teams with the guidance of a coach and found that teachers should have opportunities for autonomy in the process and topic of collaboration. After the co-construction of shared norms and a vision, the Inquiry Team members decided what topic or problem they would like to investigate. The members decided whether they all desire to investigate one topic, or whether there was a need for subgroups to investigate different subtopics. Jackson (2006) emphasized that collaboration must involve reflection, dialogue, and discourse around information. The author contended that this leads to the development of instructionally relevant knowledge. In order to foster a discourse around information, teachers were given the resources to access and read education research.

One of the goals of the Inquiry Team intervention is to expose teachers to more educational research. This process can be complex and therefore, Schneider (2015) examined the "helping fields" of nursing and social work to identify four key factors in moving research to practice. The first factor is visibility, which describes the efforts to ensure research is visible to teachers and its quality will be determined by them. The knowledge broker's role is to ensure research is accessible for teachers. Therefore, the teachers will have to be made aware of the resources and how to use them. For example, the knowledge broker may need to spend some time instructing teachers on how to

narrow their search for research when using numerous search engines. In Zeuli's (1994) study of how teacher's read research, the author found that teachers had difficulty judging the level of experimental evidence, especially when sophisticated statistics were used. Cain (2016) also found that teachers can sometimes misunderstand research. Therefore, the knowledge broker needed to address how to analyze research. The second factor that Schneider (2015) described is acceptability; research is valued by teachers and is compatible with their professional worldview. Cain (2016) explained that research can impact teachers' values, if they are challenged or supported by research. Zeuli (1994) also found that teachers had a desire to further understand research topics read when the study's conclusion did not align with their own belief systems. Therefore, the knowledge broker needed to be aware of when research may be in conflict with teachers' experiences or belief systems to ensure they can work through their thoughts through discourse with the other Inquiry Team members. The third factor is feasibility, which describes the practical applications of the research read. Shearer, Lundeberg, and Coballes-Vega (1997) and Cain (2016) found that teachers' connections to practice influenced their evaluative responses. Additionally, Shearer et al. (1997) described the relationship between teachers making personal connections to the research and their ability to construct meaning as they read research. Zeuli (1994) also found that teachers believe research should have a direct impact on their practice or expand their understanding of teaching and judge the study's merit based on such applications. Bartels (2003) found that teachers based their legitimization of articles upon their ability to integrate the new knowledge into their current knowledge base instead of the empirical evidence provided.

This research was kept in mind because teachers may find little value in reading articles that do not directly address what they should do in their classrooms.

Once the teachers have read research and analyzed it through discourse, they began to take steps to apply their new knowledge. They began to craft instructional practices based upon research and their own experiences with their context. Zeuli (1994) described the importance of gathering supporting evidence. In the author's work, it was only teachers who had a more generalized view of educational research that traveled between thinking about the articles and considering supporting evidence from their context. In the intervention, teachers worked together to consider how the information they have gathered can be applied in their context. The final factor that Schneider (2015) described is the sharing of research and teacher's views on research inside and outside of the organization; transportability. Not only were teachers provided the opportunity to share their research knowledge, but also the results of their methods of application in their study. The knowledge broker was given the task of finding opportunities inside and outside the organization for the teachers to share the new knowledge generated from their collaborative inquiry experience. Meirink et al. (2010) also asserted that collaboration must move beyond the sharing of ideas for a change in practice to occur. Participants must feel supported enough to take risks, communicate contrasting views, and report failures in order for true culture of collaboration to take place that can value learning and innovation (Goodyear & Casey, 2015; Helsing et al., 2008; Jackson, 2006). The ability for teachers to take on the roles of researcher and knowledge bearer is due to their evolution at the intrapersonal level.

Intrapersonal Level Boundary crossing

At the intrapersonal level, people begin to participate in intersecting practices as they embody the boundary (Akkerman & Bruining, 2016). As previously mentioned in the collaborative inquiry section of this piece, participating in the process of collaborative inquiry can lead to the formation of new identities. Akkerman and Bruining attributed changes to identity as being the result of perspective taking in a way that can alter one's worldview. The authors asserted that this newly constructed identity informs future practice. Sinnema et al. (2011) collected qualitative data on a collaborative inquiry experience enacted by six academics from universities and 26 teachers. These scholars found that the teachers who participated developed new pedagogical understandings and a greater capacity to learn from evidence they had gathered from their contexts. As a result, they began to identify themselves as practitioner researchers. Teachers must partake in some level of self-authorship of their identities as they begin to identify themselves as researchers and innovators. There is no clear solution for how teachers should acquire, utilize, or conduct research to improve their practice; therefore, they too will have to reinvent themselves and their work (Dagenais et al., 2012). This aligns with Akkerman and Bruining's (2016) description of transformational learning at the intrapersonal level: "A person develops a hybridized position in which previously distinctive ways of thinking, doing, communicating, and feelings are integrated" (p. 246). In such instances, collaborative inquiry provides participants with the opportunity to utilize both research and experiential knowledge. Gore and Gitlin (2007) explained that in such instances, neither form of knowledge is considered to be right but instead both have the opportunity to contribute to the collective understanding of a topic. This can combat the view that characterizes the valuing of empirical knowledge over practitioners'

personal knowledge in academia. Conversely, the opposite view is taken by teachers as they place a high value on their experiential knowledge (Bartels, 2003; Zeuli, 1994)

In order for the CoP component of the intervention to be successful, it was important for the school's teachers to participate, but they also must feel that the innovation team was not being controlled by the larger organization (Wenger, 2010). Brantlinger (2004) asserted that new roles and identities must be developed for the traditionally oppressed and oppressors. Decision-making in the field of education is often done in a hierarchal structure by policy makers and school administrators with little input from teachers (Brantlinger, 2004). It is not clear whether such structures exist with the intent to oppress teachers; however, they do little to promote teachers' sense of self-efficacy. The Inquiry Team intervention provided a platform for teachers to begin to influence the direction of their own profession. Ingvarson, Meiers, and Beavis (2005) found that participating in active learning increases teachers' self-efficacy. Butler et al. (2015) also found gains in participants' self-efficacy when involved in collaborative inquiry. The authors concluded that these positive feelings of self-efficacy can be influential in sustaining such initiatives. Participating in collaborative inquiry provided the current teacher participants with the opportunity to discover their own answers, create new ideas, and experiment with novel strategies (Helsing et al., 2008).

Those who engage in boundary crossing must remain open to changes in their identities as they have new experiences and understandings. Wenger (2010) also discussed how the participation in CoPs stimulates the negotiation of identities. The author asserted that the development of individuals' identity is always ongoing and is negotiated throughout the course of their lives. Wenger insisted that the participation in a

CoP opens up a field of possible trajectories and proposed identities. It is a field that acknowledges its many pasts and possible futures for those who desire to engage with it. Reforming the long held mental models of professional identities is an important aspect of boundary crossing at the intrapersonal level.

While the collaborative inquiry cycle was used to encourage multilevel boundary crossing, some modifications to the traditional structure needed to be made to specifically address the boundary between educational research and practice. In many suggested collaborative inquiry cycles, consulting educational research is not an integral component of the process. Instead, more focus is placed on the teachers conducting their own research and gathering data from the context. While that those are salient endeavors, consulting research should be similarly explored. To that end, Figures 8-11 illustrate how the common collaborative inquiry process was altered.

Figure 8. The collaborative inquiry cycle.

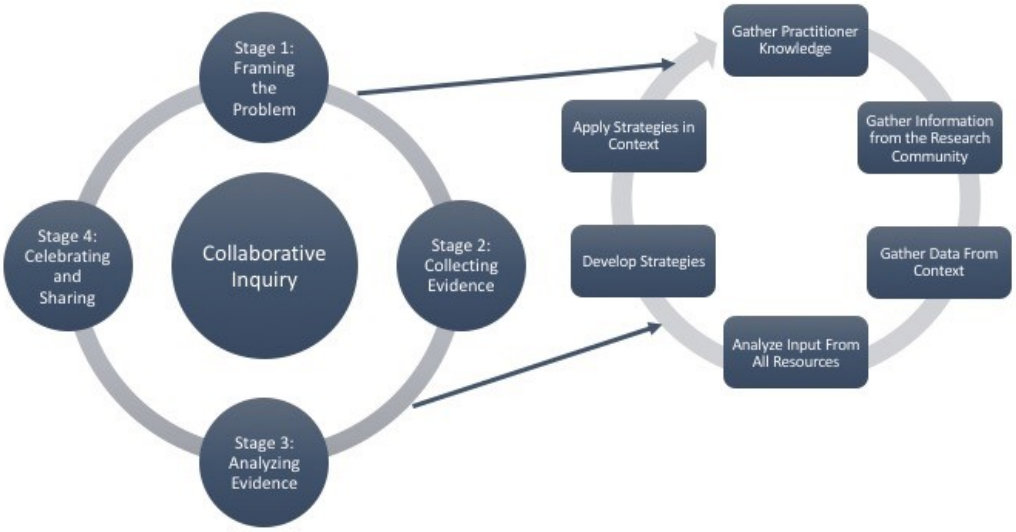


Figure 9. Alterations to the collaborative inquiry cycle.

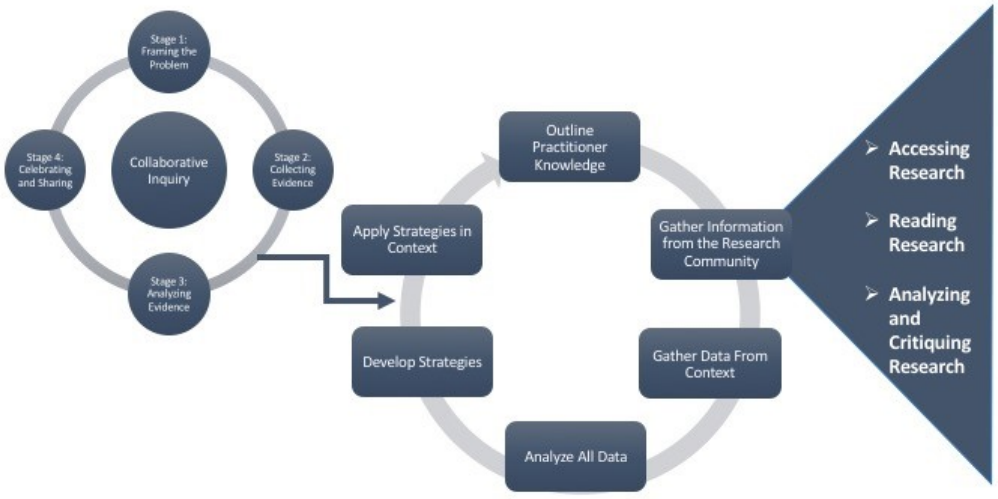


Figure 10. Alternations to the process that focuses on using educational research.

Figure 11. The new collaborative inquiry cycle.

The figures highlight the changes to the collaborative inquiry process that aims to equalize the value of knowledge from the context, practitioners, and research community. It also provides an opportunity for all of the knowledge gathered from those sources to be analyzed and utilized with the possibility of arriving at innovative solutions to the problem. These components add depth to a process of decision-making that can impact how knowledge is gained, used, and shared at Sunnyville.

Evidence to Support the Inquiry Team Intervention Model

In an effort to document the impact of educational research on practice, Cain (2015) gave three articles to a group of teachers at a secondary school in England. After reading the articles, the teachers were tasked with applying their research knowledge conducting research in their own context. Teacher interviews, notes from meetings, teachers' reports of their projects, and student work were all analyzed to generate the findings. Cain explained how every teacher claimed the research articles influenced their thinking and practice. In this study, teachers were able to apply generalized research to a

specific context and could extend beyond the original research through discourse. Goddard, Goddard, and Tschannen-Moran (2007) also described the value of discourse as an opportunity for teachers to build upon their content, pedagogical, and experiential knowledge to improve practice. In their study, the authors used fourth grade state assessment data to see if teacher collaboration is related to student achievement. The authors discovered that teacher collaboration was a moderate predictor of differences among schools in student reading (0.07) and math (0.08) achievement scores. The authors expressed a need for more empirical research to be done to solidify the connection between teacher collaboration and student achievement. While both sets of researchers used both qualitative and quantitative measures to begin to investigate the many complexities that exist around the relationship of research and practice, there is still much evidence to gather. They did, however, provide some evidence of the possible effects collaboration and consumption of education research can have on teacher's practice and student outcomes.

Inquiry Teams are not conceived of as form of professional development, although faculty are anticipated to learn and grow in ways that impact their practice. Instead, Inquiry Teams are designed to be more aligned with the research and development activities found in other sectors. This addresses a challenge to barrier crossing in the education field, specifically, that schools typically do not allocated time or resources for innovation, research utilization, and collaboration to engage in the knowledge economy like other fields have (Jackson, 2006). Addressing this is critical as teachers must have the opportunity to move back and forth across boundaries into uncharted territories for innovation to occur, for new answers to unforeseen questions to

be realized, and to find new partners in their quest for a reimagined educational experience for their students.

Chapter 4: Intervention Procedure and Program Evaluation Methodology

Purpose of Study

In this section, the researcher describes the research methods that the researcher utilized to investigate the Inquiry Team intervention. The purpose of the Inquiry Team intervention was to create a decision-making process at Sunnyville Elementary School. Through this process, the researcher aimed to mobilize knowledge amongst the research community, practitioners, and context, with the goal of making more informed decisions. The researcher evaluated the effectiveness of the intervention, as well as specifics of its implementation. Much knowledge can be gained from studying each component of the intervention in addition to its possible effect on the divide between educational research and practice. Gathering more information about the intervention's main components (i.e., the knowledge broker, community of practice, and collaborative inquiry) was also of value, because not much is known about their possible use to improve knowledge mobilization. Assessing the extent to which the Inquiry Team improved knowledge mobilization both through internal boundary crossing at Sunnyville and external boundary crossing between the education research community and practitioners is analyzed.

The following research questions were investigated in the current study:

RQ1: How was knowledge discovered, generated, and disseminated by the Inquiry Team?

RQ2: Did the work the Inquiry Team Participants engaged in have any impact on their practice?

RQ3: What is the role and some characteristics of a knowledge broker in educational settings?

RQ4: Did the Inquiry Team intervention create opportunities for multilevel boundary crossing amongst its participants, between educational research and practice and other stakeholders?

RQ5: What aspects of the Inquiry Team experience supported or inhibited knowledge mobilization?

Research Design

In this investigation, the researcher evaluated both the process and outcomes associated with the Inquiry Team intervention. Both qualitative and quantitative methods were utilized to provide greater insight into the components of the intervention and its effects on knowledge mobilization. The logic model featured below in Figure 12 creates a visual representation of the intervention's details. The green spaces depict characteristics of the entire Inquiry Team intervention. The yellow columns provide details in relation to the knowledge broker component as the blue columns relate to the community of practice. Each gray box acts as a heading to the information provided below it. The teachers who were gathering to take part in the community of practice engaged in the collaborative inquiry process; therefore, that component of the intervention is included under the community of practice sections of this model.

<table>
<tr><th colspan="3">Inquiry Team</th></tr>
<tr><th colspan="2">Knowledge Broker</th><th>Community of Practice</th></tr>
<tr><th colspan="3">Situation</th></tr>
<tr><td colspan="3">• The faculty is not often referencing primary research to inform decision-making
• Boundaries exist amongst various stakeholders, which impedes knowledge mobilization</td></tr>
<tr><th colspan="3">Priorities</th></tr>
<tr><td colspan="2">• Provide opportunities for boundary crossing experiences amongst various stakeholders</td><td>• Provide teachers with more opportunities to collaborate with others, to access research knowledge, generate knowledge, and share knowledge</td></tr>
<tr><th colspan="3">Inputs</th></tr>
<tr><td colspan="2">• Knowledge Broker role (1 person)
• Collaborative Inquiry facilitator training
• Planning for the Inquiry Team meetings (24 hours)
• Time to reach out to other stakeholders or find opportunities for knowledge-sharing (10-20 hours)</td><td>• Community of practice (6 members)
• Meeting space with internet access/projector
• 8 Inquiry Team meetings (approx. 8 hours)
• Online collaborative space
• Collaborative inquiry cycle</td></tr>
<tr><th colspan="3">Outputs</th></tr>
<tr><td>Activities</td><td>Participation</td><td>Activities</td></tr>
<tr><td>• Creates the CoP
• Facilitates IT meetings, 8 sessions (approx. 8 hours)
• Provide access to resources
• Contacts outside stakeholders/ Researchers as needed
• Encourages collaboration
• Finds opportunities for knowledge-sharing</td><td>Who is engaged…
• Education Researchers as needed
• CoP Participants (6 people)
• Knowledge Broker (1 person)
• The head of school as needed
Why they are engaged...
• Knowledge-sharing and creation
• Autonomy, innovation, and learning
• To Investigate a topic
• The opportunity to collaborate with other stakeholders
• For the advancement of the field
How they are engaged…
• Through collaborative experiences with each other and possibly other stakeholders</td><td>• Participates in collaborative inquiry around topic or problem of practice.
• Documents findings and suggestions for action
• Disseminates knowledge to other stakeholders
• Possibly collaborates/ communicates with researchers</td></tr>
<tr><th colspan="3">Outcomes</th></tr>
<tr><td colspan="3">Short Term</td></tr>
</table>

• Knowledge broker role development	• Information is gathered about the Inquiry Team as a mechanism for knowledge discovery, generation, and dissemination. • Created opportunities for multilevel boundary crossing amongst practitioners and between educational research and practice • Improved knowledge mobilization	• Teacher collaboration across organizational divisions • Teachers read research • Identity changes for faculty to encompass researcher attributes • Changes to teach beliefs about research use and/or the topic investigated • Changes to practice
Intermediate		
• Permanent establishment of a knowledge broker position at the school	• Altered teacher practice school wide in response to knowledge gained from the research and collaboration experiences • Changes in researchers practices as a result of practitioner knowledge and feedback	• The CoP is permanently established at the school and the participants engage in collaborative inquiry to solve other problems
Long Term		
• The knowledge broker position is replicated in other contexts and they begin to collaborate with one another	• The Inquiry Team model is replicated in other contexts to create networks of schools that cultivate cultures of continued learning, innovation, and collaboration. • Improved student outcomes • Knowledge is more easily mobilized between researchers and practitioners	• Members of the CoP present at conferences and find other mechanisms for communicating their knowledge with the larger educational community
Assumptions		
• Collaboration will improve knowledge-sharing • Education research can inform practice • Practitioner knowledge can inform research • Teachers and researchers will desire to participate		

External Factors
• Changes in the administrative support of the intervention • Participation rates of teachers and researchers • The depth of research available on the topic of report cards

Figure 12. Inquiry Team intervention logic model.

Process Evaluation

The researcher used fidelity measures to evaluate the process of the intervention as outlined by the logic model above. Dusenbury, Brannigan, Falco, and Hansen (2003) identified five possible mechanisms for measuring fidelity of implementation: adherence, dose, quality of program delivery, participant responsiveness, and program differentiation. Adherence, quality of delivery, and participant responsiveness are how the fidelity of implementation will be measured in this study. Table 5 displays the indicators and mechanisms for data collection for each type of fidelity measure. The data collection mechanisms are both ongoing throughout the implementation of the intervention, as well as at its conclusion.

Table 5

Measures and Indicators of Fidelity of Implementation

Fidelity Measure	Fidelity Indicator	Data Collection Tool(s)
Adherence- "the extent to which implementation of particular activities and methods is consistent with the way the program is written" (Dunsbury et al., 2003, p. 241).	knowledge broker creates CoP	knowledge broker journal
	the knowledge broker instructs practitioners on accessing, reading and analyzing research	Inquiry Team meeting recordings, knowledge broker journal, artifact analysis
	at least 6 of the 9 collaborative inquiry cycle components are delivered.	Video recordings of Inquiry Team meetings

Quality of Delivery- "ratings of provider effectiveness which assess the extent to which a provider approaches a theoretical ideal in terms of delivering program content" (Dunsbury et al., 2003, p. 244).	effectiveness of knowledge broker in encouraging collaboration, knowledge-sharing, and research use	Post QURBI survey results analysis of video recorded inquiry meetings
	83% attendance for Inquiry Team meetings	Attendance sheet
Participant Responsiveness- "ratings of the extent to which participants are engaged by and involved in the activities and content of the program" (Dunsbury et al., 2003, p. 244).	Participant completion of Inquiry Team activities	Video recordings of the Inquiry Team meetings

Outcome Evaluation

The researcher only evaluated the short-term outcomes depicted in the logic model in Figure 12. Although there is research relating to knowledge brokers, communities of practice, and collaborative inquiry, the combination of the components has yet to be studied. In addition, educational researchers have not fully explored or described what the role of a knowledge broker would entail in education settings. Additionally, while there are empirical studies of the use of the collaborative inquiry process in education settings, there are not studies of the specific cycle elements included in this study. These factors all contribute to the exploratory nature of the study. As such, the outcomes projected are intended to provide information about the intervention itself and if the intervention had the intended effects. Table 6 outlines the possible outcomes and how the researcher measured these.

Table 6

Inquiry Team Study Outcomes

Outcome Indicator	Data Collection Tool(s)	Frequency
Understanding of Knowledge Broker Role	Knowledge broker journal, knowledge broker activity log, video recordings of Inquiry Team meetings	Ongoing throughout the intervention
The Inquiry Team as a mechanism for knowledge discovery, generation, and dissemination	Video recordings of Inquiry Team meetings	Ongoing throughout the intervention
	QURBI results	Once post intervention
	Artifact Analysis	Once post intervention
Created opportunities for multilevel boundary crossing amongst practitioners and between educational research and practice. Indicated by:	Videos of Inquiry Team meetings and knowledge broker journal	Ongoing throughout the intervention
	Artifact Analysis	Once post intervention
Teachers reading research	Semi-structured participant interviews	Pre and post intervention
Teacher collaboration across organizational divisions	QURBI- Survey	Post intervention
Changes in teacher identity to encompass researcher attributes		
Changes in teacher beliefs about research use and/or the topic of report cards		
	Videos of Inquiry Team meetings	Ongoing throughout intervention
Knowledge mobilization as indicated by:		Pre and post intervention
Teachers utilizing of educational research	Semi-structured participant and non-participant interviews	
Dissemination of knowledge gained from Inquiry Team		Post intervention

	experience to other stakeholders Knowledge acquired from the Inquiry Team by non-participants	QURBI-survey results for participants and non-participants	Post intervention
Changes in teachers' practice		Semi-structured participant interviews Video recordings of the Inquiry Team meetings QURBI- participant survey	Ongoing throughout intervention Post intervention

Method

Participants

Sunnyville Elementary School has 36 faculty members in grades PreK through fifth grade. The faculty is comprised of classroom teachers and specialty teachers. The classroom teachers are responsible for teaching reading, writing, math, and social studies. They also have the students during homeroom times at the beginning and end of the day, and the teachers often use that time for community-building. The specialist teachers teach one subject over multiple grades. These subjects include art, music, instrumental, library, computer, science, wellness, and Spanish. The faculty is also comprised of teachers of various age groups with diverse levels of experience. Sunnyville prides itself in hiring a highly experienced and well-educated workforce, and a majority of the faculty possess advanced degrees.

All of the faculty were presented with the option to participate in the Inquiry Team. Participation in the intervention was voluntary for a number of reasons. The first reason for voluntary participation was the investigator's assertion that reading research

and participating in collaborative inquiry may not have appealed to all teachers. Some teachers may have been content with the current avenues for which they receive information about practice. Secondly, the intervention took place after school, and some teachers may not have wished to make a commitment that infringes on their personal time. Lastly, the desire for the teachers to participate may also have been topic related, in that the teachers may or may not have wanted to participate based upon their interest in the topic of report cards.

The researcher delivered a presentation to the faculty about the Inquiry Team intervention process, the requirements of participating in the study, and the possible topics for inquiry. The topic categories of small group reading instruction, school culture, reporting student progress, and mindfulness were derived from a one question survey given in the Spring of 2017 asking the entire faculty (N=36) what educational topics they would like to learn more about. The qualitative responses were then coded for themes and the four categories mentioned above represented the most predominant responses. After the presentation, all faculty—including the head of school—received an emailed Google form with the four themes as possible topics they would like the Inquiry Team to investigate. Twenty-eight (n=28) of the faculty members responded, representing a 0.77% response rate. The topic selected was reporting student progress (46.4%). After the vote, the faculty was informed of the topic and provided with two informed consent forms: one to participate in the Inquiry Team Investigation and one to be a general study participant. General study participants were included to gather data on preintervention conditions and if knowledge of the Inquiry Team activities mobilized to their colleagues. The faculty was given 1 week to return the forms to the student investigator.

Four general study participants and six Inquiry Team participants volunteered to join the study. This was an ideal number because a small group allows for optimal collaboration and participation. Mebane and Galassi (2003) found that the optimal group size was between four to 12 participants when conducting collaborative inquiry activities. Angus, Davis, Donoahue, Kowal, and Stewart (2003) identified six members as being the optimal sample size because it allows everyone to have the opportunity to speak, which supports their presence at the meeting as being essential. The head of school was kept abreast of the Inquiry Team's activities and could provide insight when needed; however, she was not a participant in the team meetings. Demographic information about the Inquiry Team participants is featured in Table 7.

Table 7

Demographic Characteristics of the Inquiry Team Participants

Participant	Sex	Age	Education	Position	Years of Experience	Prior Research Methods Coursework	Prior Research Project Participation
1	Female	20-29	Master's Degree	Homeroom Teacher	4 to 7	Yes	Worked with university researchers
2	Male	50+	Undergrad Degree	Specialist	20 to 23	Yes	Worked with teachers in school
3	Female	30-39	Master's Degree	Homeroom Teacher	16 to 19	Yes	None
4	Female	30-39	Master's Degree	Homeroom Teacher	12 to 15	Yes	None
5	Female	20-29	Undergrad Degree	Teacher's Assistant	4 to 7	No	None
6	Female	50+	Master's Degree	Homeroom Teacher	12 to 15	No	Worked with university researchers
Knowledge Broker	Female	30-39	Doctoral Candidate	Specialist Teacher	12 to 15	Yes	Worked with teachers in school and

Instrumentation

The questionnaire about the use of research based-information (QURBI).

The QURBI was developed by Lysenko et al. (2014). The survey was given to 1,153 school practitioners to evaluate the extent to which the educators use research to inform their practice. The survey's questions assess four main themes: practitioners' opinions about research, practitioners' individual expertise in accessing, reading and applying research, the extent to which practitioners engage in activities or with persons that increase their awareness of research, and organizational factors that can inhibit or support the use of research.

The QURBI provide quantifiable data about the perspectives of a small percentage of the faculty in regards research use and the organizational culture before the study began. After the study's completion, general study participants were given the QURBI again with a section added that included 10 questions inquiring about the extent to which—if any—knowledge was mobilized from the Inquiry Team members. Information from the qualitative data collected throughout the study was used to add questions to the QURBI for Inquiry Team participants. Five sections were added asking the Inquiry Team participants about the following: the Inquiry Team experience, the Inquiry Team experience as it relates to the problem investigated, the value of the Inquiry Team process, the level of difficulty of the Inquiry team process, and the facilitator's role. See Appendix B for the Inquiry Team participant survey and Appendix C for the non-Inquiry Team participant survey.

Semi-structured interviews. Semi-structured interviews were conducted pre and post intervention. Preintervention interviews were conducted with the head of school, two Inquiry Team participants, and two general study participants. Survey questions inquired about current decision-making and collaborative processes. See Appendix D for a copy of the questions presented to the head of school and Appendix E for questions presented to the other study participants. Semi-structured interviews were also conducted after the intervention to ask participants to expand upon some of the survey and focus group responses. The interviews were audio recorded and transcribed using the student investigator's computer. See Appendix F for a sample of the questions used.

Inquiry Team meeting recordings. Every Inquiry Team meeting was recorded for later analysis; these recordings often served as reflections for the knowledge broker. Portions of each recording were transcribed for analysis. There were eight meetings in all, with each lasting about 1 hour and 15 minutes. The meetings were recorded using the student investigator's computer.

Focus group questions. At the conclusion of the study, the Inquiry Team participants were asked to answer questions together as a group about the Inquiry Team experience and the groups' facilitator. The facilitator was not present during the group's discussion to ensure that their answers would not be influenced by her presence. The form given to the Inquiry Team members can be found in Appendix G.

Knowledge broker's journal. The knowledge broker recorded her thoughts and experiences in a digital journal. The knowledge broker's reflections often occurred after Inquiry Team meetings or after interacting with the head of school. There were 10 reflections in all.

Activity logs. The Inquiry Team members were provided with logs before the experience began to log the amount of time they spent engaging in activities in between Inquiry Team meetings. The knowledge broker was given a similar log, which is featured in Appendix H. Samples of the Inquiry Team members' logs can be found in Appendix I.

Artifact analysis. An artifact analysis of salient materials used during the Inquiry Team experience was conducted. This included an analysis of the research articles that the participants read, group norms, fishbone diagrams, and any other documents that provided insight into the workings of the group.

Procedures

The intervention. In the study, the student investigator assumed the role of knowledge broker. After the participants agreed to take part in the Inquiry Team, the knowledge broker emailed the participants information about the first meeting. The intervention began in January 2018, which was later than anticipated because some delays in IRB approval delayed the start of the study. It was important for the knowledge broker to establish a culture of collaboration, trust, and emotional safety within the community of practice. To begin that process, the participants worked together to identify group norms that would create a culture of mutual respect. Once the community norms were established, the team embarked on beginning the collaborative inquiry process.

In the next seven meetings, the team engaged in various aspects of the collaborative inquiry process. Collecting data from a number of sources (i.e., practitioner knowledge, research, context) consumed many of the meetings. The knowledge broker followed the collaborative inquiry cycle, but remained flexible to make alterations to the process as needed. The participants communicated between meetings using Microsoft

Outlook. The Inquiry Team experience ended with a presentation given by the participants.

Data collection. Quantitative data collection occurred before and after the implantation of the intervention and was collected using the QURBI survey. Qualitative data collection occurred before, during, and after the intervention. A timeline of data collection is included in Table 8.

Table 8

Timeline of Data Collection

Pre Intervention	Intervention	Post Intervention
January 2017	January-June 2018	June 2018
Semi-Structured Interviews QURBI Survey	Inquiry Team video recordings Knowledge broker's journal Participant and Knowledge broker activity logs Artifact Collection	QURBI Survey Focus Group Semi-Structured Interviews Artifact Collection Collection of Participant Activity Logs

The data collection timeline was impacted by the school's calendar of events. For example, data collection did not begin until January, even though the topic and Inquiry Team were known in December, because there was a 2-week break that began in December that lasted until the beginning of January. Similarly, the end of the year was very hectic; therefore, participant interviews and survey data were collected until the end of June.

Data analysis. The researcher followed a convergent mixed-methods study design in order to gain information about the Inquiry Team intervention using both qualitative and quantitative methods (Creswell & Clark, 2011). As is characteristic of the convergent design, the qualitative and the quantitative data were analyzed separately. Both convergent and divergent findings from the qualitative and quantitative data were analyzed. In the sections that follow, the researcher will outline a more detailed description of the qualitative and quantitative data analysis procedures.

Qualitative data. In the study, qualitative data were gathered from several sources: the knowledge broker's journal, semi-structured pre and post intervention interviews, focus group questions, artifact analysis, and recordings of the Inquiry Team meetings. The semi-structured interviews and the Inquiry Team meetings were recorded. These recordings were listened to by the student investigator for analysis, and selected portions of the recordings were transcribed. Data from the transcriptions and the knowledge broker's journal will be coded through notes written directly on the documents and/or were housed in Excel spreadsheets. Creswell and Clark (2011) defined coding as "the process of grouping evidence and labeling ideas so that they reflect an increasingly broader perspective" (p. 208). In order to delve more deeply into investigating the participants' experiences, the researcher conducted interpretative phenomenological analysis (Pietkiewicz & Smith, 2012). This form of data analysis promotes an inductive approach that aims to provide detailed descriptions of the participants' experiences as an Inquiry Team member or as a teacher at the school prior to the intervention. When analyzing the transcripts and when watching the videos, the student investigator made notes of her thoughts and observations. The investigator's

notes were included in the larger coding process to provide more depth to the analysis. The researcher identified and organized themes across all data sources to address the research questions.

Quantitative data. Quantitative data were collected pre and post intervention using the QURBI survey with some added sections to inquire about the Inquiry Team experience and about any knowledge mobilization that may have occurred. Descriptive statistics were used to analyze the data as the small sample prevents a more in depth statistical analysis. The survey data were compared to the qualitative themes. Although the QURBI was given pre and post intervention, the results were not statistically compared because the sample was quite small.

Summary Matrix

The information in Table 9 summarizes the data collection and analysis process for each of the research questions.

Table 9

Summary Matrix

Research Question	Data Collection	Data Analysis
RQ1: How was knowledge discovered, generated, and disseminated by the Inquiry Team?	*Qualitative* recordings of Inquiry Team meetings knowledge broker journal semi-structured interviews artifacts	recording transcriptions, artifacts, semi-structured interviews, and the journal will be analyzed, organized, and coded for themes
	Quantitative post survey data	descriptive statistics
RQ2: Did the work the Inquiry Team Participants engaged in have any impact on their practice?	*Qualitative* recordings of Inquiry Team meetings semi-structured interviews	recording transcriptions and the semi-structured interviews will be analyzed, organized, and coded for themes

	Quantitative post survey data	descriptive statistics
RQ3: What is the role and some characteristics of a knowledge broker in educational settings?	*Qualitative* knowledge broker journal recordings of Inquiry Team meetings semi-structured interviews artifacts	recording transcriptions, artifacts, semi-structured interviews and the knowledge broker journal will be analyzed, organized, and coded for themes
	Quantitative post survey data	descriptive statistics
RQ4: Did the Inquiry Team intervention create opportunities for multilevel boundary crossing amongst its participants, between educational research and practice?	*Qualitative* knowledge broker journal recordings of Inquiry Team meetings semi-structured interviews artifacts	recording transcriptions, artifacts, semi-structured interviews, and the knowledge broker journal will be analyzed, organized, and coded for themes
	Quantitative post survey data	descriptive statistics
RQ5: What aspects or characteristics of the Inquiry Team intervention supported or inhibited knowledge mobilization?	*Qualitative* recordings of Inquiry Team meetings knowledge broker journal post interview data	recording transcriptions, the journal and post interview data will be analyzed, organized, and coded for themes
	Quantitative post survey data	descriptive statistics

Conclusion

The researcher evaluated the entire Inquiry Team intervention and its individual components using a convergent mixed-methods study design. Many of the same data collection methods were used to assess the intervention's process and outcomes. The QURBI survey, focus group, semi-structured interviews, video recordings of Inquiry

Team meetings, knowledge broker's journal, activity logs, and other artifacts were all used to collect data of the experience. In addition, the student investigator's participation in the intervention as the knowledge broker provided her with the unique opportunity to experience the studied phenomenon first hand. The researcher synthesized all of this information in order to provide a detailed depiction and analysis of the Inquiry Team as a possible catalyst for boundary crossing.

Chapter 5: Findings and Discussion

The primary objective of the current study was to investigate the possible effect that the Inquiry Team intervention had in promoting multilevel boundary crossing between educational research and practice at Sunnyville Elementary School. The researcher also assessed the extent that the intervention had an impact on boundaries being crosses within the organization. The study also documents and describes the components of the intervention which included: a knowledge broker, community of practice, and collaborative inquiry. To assess the many complexities of the intervention, the following research questions served as a guide:

RQ1: How was knowledge discovered, generated, and disseminated by the Inquiry Team?

RQ2: Did the work the Inquiry Team participants engaged in have any impact on their practice?

RQ3: What is the role and some characteristics of a knowledge broker in educational settings?

RQ4: Did the Inquiry Team intervention create opportunities for multilevel boundary crossing amongst its participants, and between educational research and practice?

RQ5: What aspects of the Inquiry Team experience supported or inhibited knowledge mobilization?

The Process of Implementation

Six teachers volunteered to participate in the Inquiry Team: One PreK teacher, one first grade teacher's assistant, one third grade teacher, two fifth grade teachers, and one third through fifth grade science teacher. Prior to the group's first meeting, there was

a process for determining the topic of inquiry. In May 2017, a survey was given to the faculty which asked them to list some educational topics they would like to learn more about. The qualitative data were then coded and the four following themes were revealed: reporting student progress, mindfulness, school culture, and small group reading. In November 2017, the faculty was informed of the Inquiry Team opportunity and the aforementioned categories. As such, the Sunnyville faculty and administration (n=36) had the opportunity to participate in a survey where they could vote on the category they would most like the Inquiry Team to investigate. When the faculty was presented with the four categories, a majority of the respondents (n=28, 46.4%) chose reporting student progress; therefore, the Inquiry Team set out to explore the many facets of that topic.

Originally, scheduled to meet seven times from January 2018 to June 2018, the Inquiry Team decided that one additional session. Meetings were held after school on Tuesdays at Sunnyville in one of the participants' classrooms. Meetings were held after school and lasted on average 1 hour and 19 minutes. The teachers volunteered their time to participate in the Inquiry Team. Scheduling was impacted by the head of school's determination that it was not possible to align the meetings with the current professional development framework of the school, as was originally intended by the researcher. Therefore, participants made time for meetings on days where there were not faculty meetings, professional learning community meetings, Sunnyville council meetings, or other after-school events. This often made it difficult to schedule meetings, and this challenge may have impacted the study in ways that the researcher did not assess. In addition to the time that the participants set aside for the actual meetings, according to

their logs, the participants spent an average of 5 hours and 33 minutes on Inquiry Team activities outside of meeting times (n=5; one participant did not submit a log).

Before the first meeting, the head of school and the entire faculty were informed by the knowledge broker that reporting student progress was the topic selected. The knowledge broker was tasked with communicating with participants to schedule Inquiry Team meeting dates and for developing an agenda for each meeting. The agenda for each meeting was developed by the knowledge broker using a combination of pre-planned goals and taking into account content and logistic factors such as what occurred at previous meetings, the length of meeting time, the school calendar, and other extraneous contextual events.

Meeting 1

The knowledge broker began the first Inquiry Team meeting by distributing a binder to each participant that contained resources and an organizational system that would help them to organize materials throughout the experience. The binders were used throughout the project and participants brought them to every meeting. To launch the project, the knowledge broker explained the vision of the Inquiry Team (see Appendix B) and reminded the group of the collaborative inquiry process they would be following (see Figure 11). Before beginning to embark on the process, researchers have suggested the importance of establishing group norms (Meirink et al., 2010; Slavit et al., 2008). Establishing group norms was the first collaborative act that the group engaged in, which proved to be a nonthreatening mechanism to ease into the collaborative inquiry process. The group's norms are featured in Appendix C.

Following this, the collaborative inquiry process moved to a discussion of the topic of reporting student progress where the participants decided to narrow the scope of

the investigation to focusing on report cards. A brainstorming session then ensued about report cards at Sunnyville and absence thinking (contemplating what is not being thought of) was used as a strategy to ensure all factors were considered (Harrington & Vochl, 2014). After the problem was explored, the participants decided to collect data from the context to better understand the problem. Each participant, knowledge broker included, left with a task to complete. Representative tasks included: gathering information about where the report cards go after Sunnyville, the history of report cards at school, report cards from other independent schools, report cards from other divisions at Sunnyville, report card consistency across grades and between grade level partners, and guidelines for writing report cards.

Meeting 2

After the first meeting and prior to the second, the knowledge broker informed the head of school that report cards was the Inquiry Team's topic of investigation and the events of that meeting were disclosed to the participants. This was the first of subsequent moments when the knowledge broker was tasked with going between the two stakeholders. More information about such interactions are detailed in the knowledge broker section below. During meeting 2, the components of the Microsoft Outlook online space were shown to the participants. Unfortunately, throughout the intervention, members often found it difficult to navigate; therefore, google documents were used to supplement.

Following the introduction to the online tool, the knowledge broker presented a fishbone diagram that she had created to graphically represent the problem and factors that the group had brainstormed from the previous meeting. The group loved the diagram and remarked how they wanted to use it in their classrooms. The knowledge broker asked

the group for feedback and changed the diagram as needed. The modified fishbone diagram can be viewed in Appendix D. Participants shared and grappled the information they gathered independently in the time between sessions one and two. They determined more information was needed and decided create and distribute a teacher survey and a parent survey would give the team even more information about the report cards. Anticipating this may be a topic of discussion based on interactions with various stakeholders between meetings, the knowledge broker provided the participants with a resource pertaining to writing survey questions. The team members were charged with brainstorming questions in the online space before the next meeting.

Meeting 3

At the start of the third meeting, only two of the teachers had shared sample questions prior. The team used those questions as a catalyst for crafting the parent survey. The resources the knowledge broker provided at the previous meeting was utilized often in this process. The process took much longer than expected as the participants contemplated with proper wording, examined sample surveys, investigated types of scales, and discussed the best way to distribute the survey. The knowledge broker and Inquiry Team members emailed the completed survey with the head of school at the conclusion of the meeting. The participants were tasked with generating questions for the teacher survey before meeting 4. Creating surveys was not a task the knowledge broker had anticipated engaging in when planning for the experience; however, this proved to be a salient part of the data collection process.

Meeting 4

Compared to creating the parent survey, creating the teacher survey was a much faster process because the participants were more familiar with how to create surveys and

more questions were generated between meetings making the process quicker during the meeting. Following creation of the teacher survey, the knowledge broker used the rest of the meeting to discuss accessing, reading, and analyzing research. The participants were given many resources (see Appendix E) and were provided with example empirical, meta-analysis, and opinion articles as they were the formats they were likely to have found. Additional resources were also placed on the online group space about developing search terms and using Boolean operators. The participants were also shown how to use Google Scholar as a tool to search for and cite articles. There was not time to brainstorm search terms or begin searching for articles, as the knowledge broker had planned. Completing the teacher survey and discussing research were two tasks that had to be completed in this meeting due to a 2-week spring break after this meeting. Spring break was a good time to dispense the teacher survey to the faculty as they might be less busy then when school was in session, which the team felt would lead to higher participation rates. Similarly, the knowledge broker felt that the Inquiry Team participants would have more time over the break to read research articles.

When discussing strategies for researching the topic of report cards, the participants felt it would be best to narrow the search to a few subtopics. The team decided on the following subtopics: narrative report cards, grades, and alternative report cards. They of course could read any article related to report cards but the participants each selected a subtopic to focus on so the search would not be too vast. These subtopics were derived from the participants own knowledge of report cards. The participants were instructed to reach out to the knowledge broker if they needed assistance accessing articles.

Meeting 5

The fifth meeting began with the participants sharing the research they found with the group. As each person shared, the group grappled with the information presented and related it to their own experiences at times. The participants also interweaved discussion of the problem with the discussion of possible solutions. Many of the participants outlined the difficulties they had in accessing research during the break; however, none of the participants reached out to the knowledge broker for help, and indicated at the meeting that this was for fear of bothering her. The knowledge broker reiterated her desire to help in this area and the participants subsequently emailed her links to articles that they could not find. The discussion ended with the identification of additional areas of inquiry and new search terms to use for further investigation.

The knowledge broker next shared the teacher survey results with the participants and showed them how to code qualitative data. This was another activity the knowledge broker had the participants engage in that was not originally anticipated in the planning. The amount of data was too vast for the knowledge broker to have the time to code it on her own. Thus, it was imperative that they participated in the coding, furthermore the process enabled the participants to closely analyze the data. Before the next meeting, each participant had four questions to analyze.

Meeting 6

Team members engaged in the qualitative coding and analysis in the time between the fifth and sixth meeting. The sixth meeting began with the knowledge broker answering individual coding questions. The knowledge broker had not anticipated how difficult some participants would find coding. The participants then shared the themes they discovered with the group. With the intention to save time, the knowledge broker

coded the entire parent survey for themes and shared the results with the team. The discussion focused on continuities and discontinuities of the data. Following this, participants shared more research articles they had read and some asked the knowledge broker for additional help accessing resources. The meeting concluded with the team beginning to discuss possible solutions to the problem, what characteristics the new report card might have, and the presentation scheduled in June.

Meeting 7

Like many meetings, the seventh began with a discussion of logistics. The knowledge broker distributed copies of the coding Excel document to every participant. Discussion then ensured surrounding the head of school's request to release some of the parent survey results early. The participants did not agree for a number of reasons. When the wishes of the participants and the desires of the head of school were in conflict and thus made the knowledge broker's role was more difficult.

The knowledge broker had previously organized the presentation for June into sections and asked the group for their input. Then the participants, including the knowledge broker, each selected a section, and the participants provided feedback about the suggested formatting for the presentation. The team then discussed what the report card format should look like based on their research. This was more difficult than anticipated as it required some innovation as none of the resources (i.e., context, education research, practitioner experience) referenced provided a clear solution. By the end of the meeting, a format was chosen. The participants worked on their slides for the presentation and the report card format before the next meeting.

Meeting 8

The eighth meeting was added at the request of the participants, to ensure the team was prepared for the presentation. In between the seventh and the eighth meeting, the participants worked on their part of the presentation and some aspects of the report card format. The format of the report card was discussed and modified. Much time was spent on selecting the proper wording and skills represented (see Appendix F). The PowerPoint presentation was also reviewed and discussed. Changes were made based on the feedback of the team. The presentation of the information was given much consideration to ensure that there was no bias, and some topics were noted to maybe cause some discomfort amongst the faculty and administration. Participants were to make any last adjustments to the report card document and the slide show before the presentation to the faculty.

The Presentation

The Inquiry Team participants presented their findings to the head of school and their colleagues on June 11th. Before the presentation, the knowledge broker met with each member individually to offer support if needed, to ensure they felt prepared. The presentation lasted 1 hour and 15 minutes. Following the presentation, some faculty members and the head of school voiced some concerns and others demonstrated their agreement with some points that were being presented. The head of school mentioned that the conversation will continue in the upcoming year, perhaps in a professional learning community format. The Inquiry Team dispersed after the presentation.

Process Evaluation

Several fidelity measures were used to evaluate the implementation process. Adherence, quality of delivery, and participant responsiveness (Dunsbury, et al., 2003)

were the measures used to evaluate the Inquiry Team intervention. Although the intervention began later in the year than originally intended, the intervention was delivered with fidelity despite the shortened time frame.

To ensure the intervention was adhered to as designed, video recordings of the Inquiry Team meetings, the knowledge broker's journal, and artifacts were analyzed. The analysis revealed that the knowledge broker did begin the community of practice, instruct the participants in using research, and was able to complete seven of the nine collaborative inquiry phases. Given the length of time to complete the intervention, it was not expected that the entire collaborative inquiry cycle would be completed. The phases completed included: framing the problem, gathering practitioner knowledge, gathering information from research, gathering data from the context, analyzing input from all resources, developing strategies, and sharing findings. The investigator suspected that work around report cards will continue in the upcoming year as a new format continues to be developed. Once a new format is developed, then the *apply strategies in context* and *analyze evidence* phases can be completed. When making significant policy changes, it may take a number of years to complete the collaborative inquiry cycle.

QURBI survey results post intervention and video recordings of the Inquiry Team meetings were analyzed to assess the quality of the intervention's delivery. The quality of delivery was measured by the knowledge broker's ability to encourage collaboration, knowledge-sharing, and research use. Survey results revealed the quality of the intervention's delivery as it relates to the knowledge broker's performance in Table 10.

Table 10

QURBI Results Indicating the Quality of the Knowledge Broker's Role in the Intervention's Delivery

Statement	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Expanded my knowledge of reading research	3 (50%)	2 (33%)	1 (17%)	0	0
Expanded my knowledge of how to access research	2 (33%)	4 (67%)	0	0	0
Expanded my knowledge of how to access research	2 (33%)	3 (50%)	0	1 (17%)	0
Was knowledgeable about utilizing research	5 (83%)	1 (17%)	0	0	0
Encouraged collaboration	6 (100%)	0	0	0	0
Encouraged me to share my thinking	5 (83%)	1 (17%)	0	0	0

The participants' survey results indicate that there was a high level of quality associated with the knowledge broker's delivery of the intervention. If there was not a time constraint, the knowledge broker would have devoted more time to working with the participants around accessing, reading, and analyzing research. The lack of research literature to support a deep exploration of the topic of report cards was also a factor in devoting time to those activities as other sources of information were more salient.

Levels of participant responsiveness in the intervention was assessed with multiple indicators. The knowledge broker kept attendance records of each Inquiry Team meeting, with the goal of an 83% attendance rating occurring at each meeting. This was met and exceeded as every meeting had an 100% attendance rating except for one which had 83% attendance. As such, there was an approximate 97% attendance rating of the meetings overall; however, there were a few occasions when a participant would have to come to a meeting late or leave a few minutes early if the meeting ran longer than

expected. In addition to their attendance, the Inquiry Team participated in every aspect of the intervention as was revealed in the video recordings of the meetings. The participants all collaborated and communicated during the Inquiry Team meetings. The members also worked diligently outside of the meeting times to collect information from the context, read research, create survey questions, analyze survey data, and work on their presentation. Information gathered about the Inquiry Team intervention can provide more insight into the high levels of participation by the group members.

Outcome Evaluation

Multiple data sourced provides insight into the outcomes of the intervention as they relate to the research questions, this section includes focus group, QURBI survey results, and post participant interview data that the researcher used to provide a picture of the participants' overall experience as an Inquiry Team member. The data revealed that the participants had largely positive experiences. QURBI results revealed that 67% of the participants found the experience very valuable and 33% found it valuable. There were no participants that did not find it valuable. Similarly, positive results were recorded when the participants were asked about the Inquiry Team meetings in particular. A majority of the respondents found the meetings to be very valuable (83%) or valuable (17%). No respondents found the experience not valuable. The participants were asked how valuable each component of the process was. The results are displayed in Table 11 below.

Table 11

Participant Responses Relating to the Value of Inquiry Team Experiences

Part of the Process	Very Valuable	Valuable	Undecided	Somewhat Valuable	Not Valuable
Completing activities between meetings	2 (33%)	4 (67%)	0	0	0
Identifying factors that influenced the problem	4 (67%)	2 (33%)	0	0	0
Considering their experiences relating to the problem	4 (67%)	2 (33%)	0	0	0
Gathering information about their colleague's experiences relating to the problem	2 (33%)	4 (67%)	0	0	0
Gathering information from educational research	2 (33%)	3 (50%)	1 (17%)	0	0
Information from the school community	5 (83%)	1 (17%)	0	0	0
Analyzing information from all of the sources	3 (50%)	3 (50%)	0	0	0
Developing new strategies based on the information	3 (50%)	3 (50%)	0	0	0
Considering how the strategies could be applied in our school	3 (50%)	3 (50%)	0	0	0
Presenting the information to our colleagues and the administration	2 (33%)	3 (50%)	1 (17%)	0	0

The table above indicates that the participants found most of the activities valuable. It is interesting to note that in this instance, the participants found the information gathered from the school community (i.e., teacher and parent surveys, report cards from other Sunnyville divisions and other independent schools) to be more valuable

than information gathered from educational research. This is most likely a reflection of the research on report cards being of less depth than expected. The information gathered from the focus group echo's this sentiment as the respondents wrote the "research was thin" under the section that inquired about what did not work. In the post interviews, some of the respondents expanded on this theme when asked about their experiences interacting with research.

> Cassidy: "… it was interesting to see a topic that was very important to us and to our school and to see that there really wasn't a whole lot of research surrounding the topic. It didn't make it not a topic worth exploring but it made the whole process a little bit more challenging."

> Karen: "Well, as it is not something that I typically do or have thought to do always as a teacher, I think it is important to look at what has been studied, see that there were some possible holes. See that maybe even the things that we were able to find weren't necessarily as current, so it was interesting to see the data and also to see maybe there were some places where it could be beefed up a little bit."

The difficulties that the participants faced in finding and accessing relevant research to inform their thinking about ways of reporting student progress will be explored further later in this chapter.

The positive sentiments were also reflected when the respondents were asked the extent to which the experience encouraged their interest in participating in future Inquiry Team opportunities. Four participants (67%) agreed and two (33%) strongly agreed that their experience encouraged future interest. In the post interviews, the participants were asked whether they felt that the Inquiry Team process was a professional development format could be utilized in the future. Below are their responses:

> Karen: "Definitely I think that because, as we mentioned as a group, it feels so empowering and that it is voluntary and no teacher likes to stay after school and go to a meeting. But, you know, I looked

> forward to it because I felt like it was something I chose to do, I felt like it was going to create an impact and teaching children every day is a wonderful thing and sometimes you want to feel more like an adult and you want to have time to talk to other adults. And there is very little time for that except for when you're talking about the kids and how to help the kids and so this was a nice way to feel like…you were back in a community of learners and professionals and you were doing something that mattered. And we do something every day that matters with the kids but we also need to have that fulfilled too as adults, as learners ourselves."

> Dan: "Yeah, for a lot of different problems, yeah for sure. I think a lot of educators like that kind of format, they like to have the hard data. I think it's a good way to solve problems. A nice way too when your explaining to parents for example, why is something changing, to have the back up of well this is what we did to come up with it, not just we sat here and decided. I think it could be used to approach a lot of different challenges that we have."

These comments illustrate an increased sense of professionalism and professional identity that the experience provided for the participants as illustrated by their uses of ideas such as empowerment, fulfilled as adults, and a sense that research can be used to support their decisions. These sentiments are further explored later in this paper. While the participants' responses about the process overall were quite positive, in the pages that follow, the researcher will outline the complexities of the experience and illustrate some challenges and successes for the participants and the school.

Findings and Conclusions

RQ1: How was Knowledge Discovered, Generated, and Disseminated by the Inquiry Team?

How was knowledge discovered? When analyzing the inquiry process, much time was spent gathering information about the topic. The knowledge the participants brought to the process was on display at the first meeting when they were asked to describe facets of the problem. The school currently uses a combination of a checklist

and a narrative report card; no grades are used. Here is a sample displaying the type of discourse that occurred to really analyze the problem:

> Alaina: "How much value is there in a six page, or eight page, and to read it, what do the parents take away from it. Is there a better way to do it?"
>
> Josh: "Also, are they getting what you want them to get out of it?"
>
> Karen: "They word it in such teacher language, do they actually know what you are trying to say, because you just can't point blank say it."
>
> Dan: "Well it can be interpreted the wrong way."
>
> Josh: "And it's inconsistent."
>
> Cassidy: "I was going to say that Josh, consistency across the board right because, across grades.
>
> Josh: "With my experience with two different grades last year."
>
> Cassidy: "Just the fact that you do a narrative makes it so individualized which can be a positive but can also be a negative thing, I mean in terms of how just one teacher communicates and so the picture that's being painted for a parent of a child can be very inconsistent. If one teacher tends to be very flowery and then the next year by no maybe change in behavior but another teacher is much more direct…I mean even that, well how can they be one way in this class and one way in another and sometimes it's just the style so their left open for such interpretation when it gets to be that long.

This short excerpt displays the teachers' array of experiences and knowledge about the topic in their context. Each factor they identified was added to a board, which led to new connections and ideas. The teachers then took some time to find information about report cards from the school. They wanted to examine current report cards for consistency, collect an oral history from a veteran teacher who was not in the group, and look at report cards from other schools and from other divisions within Sunnyville. The participants

also decided that it would be important to gather survey data from parents and the faculty about report cards.

After being provided some information about accessing, reading, and analyzing research (see Appendix E), the participants were given examples of journal articles that were literature reviews, empirical studies, and a meta-analysis as they were commonly found formats when researching. The participants had a 2-week spring break to gather and read research. After they shared their findings, the team members searched for some more information. Many of the participants had difficulty finding relevant articles which led to some frustration. The participants gave copies of the articles they read to the knowledge broker for analysis. Sixteen articles and one book were turned in although some members said they read articles online but they couldn't find them to print. Therefore, this sample is not representative of all of the articles that the group may have read. The articles gathered fell into the following categories: empirical (4), meta analysis (1), journal article-opinion (1), articles from educational organizations (not journals) that cited research (6), opinion articles not from a journal (4), book (1). The teachers were also asked to rate the articles as 1 being *not influential* to their thinking, 2 being *somewhat influential*, or 3 being *very influential*. Table 12 shows the ratings for each resource.

Table 12

The Ratings for Each Resource

Empirical	Meta Analysis	Journal article-opinion	Educational organizations	Opinion article (not journal)	Book
1,1,2,2	3	1	1,1,3,3,3,3	1,2,2,3	2

When examining the data, articles from educational organizations appeared to have the most influence on the groups thinking. This idea was reinforced by some of the discourse cataloged from the Inquiry Team meetings. One article in particular was pivotal in influencing the thinking of the group. Here is an excerpt from an Inquiry Team meeting discussing that article:

> Karen: "I don't know it just had a lot of really interesting points in it. Actually, if you start from the back he has like what to consider…One part of it he talks about longitudinal reporting. Some schools are looking at, he gives an example of language arts proficiency. Basic, proficient, advanced. And it's like a rubric based progress report. Because one of his points is that parents, given my own experience I agree with this, parents want to know, they need context…parents don't have that context…just a simple slip of a word, we think we are conveying that clarity to parents and it's not clear…so his point is"
>
> Dan: [just walked in] "That's the article I was reading too!"
>
> Karen: "Oh yeah, really!"
>
> Dan: "Yes, I only got half way through. It's good!"
>
> Karen: "It's so good!"
>
> Dan: "It got me really thinking, sorry to interrupt, I just got excited."
>
> Knowledge Broker: "Well now you have to share it with all of us."
>
> Karen: "Oh, I will."
>
> Dan: "I forgot to bring mine it's still at home, I'm still reading it."
>
> Karen: "I don't know, do you think it is research based? I couldn't find any relevant studies, I looked at the references."
>
> Dan: "I'm not sure, some of it really brought up some questions though about the whole comparison thing, that could go crazy, but it made sense, thinking of it as a parent I would love to know that."
>
> Karen: "Me too"

Dan: “That would help me understand better.”

Karen: “Right, so they also give an example of spelling [explained example]…it provided a context and provided more information so you could see the variable, you could see the change and what’s nice about it too is that it helps you with consistency among teachers, consistency among grades.. [gives a reading example]. It just made more sense to me rather than just random skills that never correlate from year to year. Okay they did that in second grade and I get a whole new list of skills how are they related, how are they progressing?”

Dan: “Parents need to know too in the major scheme of things, well what does this mean in life. That’s nice that he’s growing and I’m happy to know that but…”

Cassidy: “He’s still three grade levels behind.”

Dan: “Exactly, and you need to know that as a parent and you do not want the shades to be pulled over your eyes about that.”

Cassidy: “Or it hits them like a ton of bricks when they leave here.”

Dan: “Exactly.”

This exchange was salient for a number of reasons. The first reason is that this article helped to provide the group with some direction for a possible solution to their problem. Even though, the article is not from a journal or empirical research, it provides a language for the participants to use to dissect aspects of reporting student performance and provides example formats. The article is from *Education Leadership* magazine and it does reference a few sources; however, the article is largely based on the author’s opinion. The excerpt above also illustrates how motivating relevance is to the participants. In the discourse, Karen does question whether the article is research-based, but that does not stop the conversation or diminish Dan’s excitement about the article’s contents. As such, the exchange suggests relevance may be more important to teachers when utilizing information than the quality of the research the information is derived, but

more research would have to be conducted to confirm. In addition, the exchange illustrates how some participants were still having difficulty identifying different types of articles and would need more practice developing this skill.

When analyzing all of the discourse of when the participants were sharing their research, this was the only moment excitement that was ever expressed. In most cases, they lamented about how difficult it was to find information, which is a theme that will be explored more later. Discourse is an important tool that provides support as participants begin to cross the boundary on an interpersonal level. It is through discourse that the participants analyze the information from the research community and connect it to their own experiences. In addition, Karen's questioning if the article was research based (empirical) may be an indication of boundary crossing at the intrapersonal level as her identity begins to take on characteristics of a researcher.

How was knowledge generated? After all of the information was gathered and analyzed from various sources, it was time to generate a possible solution to the problem. None of the sources provided a definitive path forward and therefore the teachers would have to use the knowledge they gained to develop an innovative solution tailored to the Sunnyville context. This was no easy task, and there was more silence sprinkled into the participants' discourse than in prior meetings. Here is an excerpt from that conversation:

> Dan: "What do we want it to have? Before we think about how it will look, what key aspects do we think it should include?"
>
> [11 seconds of silence]
>
> Knowledge Broker: "Anybody?"
>
> Dan: "I asked so I'm not answering." [laughter]
>
> [7 seconds of silence]

Josh: "…I think from the parents and from the teachers we saw some sort of shorter length."

Dan: "So it's like more direct and less wordy"

Josh: "um hum" [shaking head yes]

[Some of the participants review the survey results again]

Knowledge Broker: "Does anyone have any idea in their head they were thinking about? You can draw it on the board."

Karen: "Well, I'm looking up some here [on the internet] that are kind of similar to the ones we saw in that one article [from Education Leadership] and it gives instead of just a skill…it gives a range of skills and explains each one."

The discourse featured above illustrates how the participants considered information from many different sources to guide their decision-making including information gathered from the context (surveys), articles (research), and the Internet websites that had sample report card formats. This serves as yet another example of boundary crossing on an interpersonal level. The empirical research gathered often informed the participants of what not to do instead of providing much direction as to what should be done or the best ways of reporting student progress. For example, empirical research provided much negative feedback about grades, therefore, grades were not a possible solution presented in this scenario. Even though empirical articles were not often referenced during this time of problem solving and innovation, they had guided the participants thinking prior. Additionally, the *Education Leadership* article that was not deeply research based did provide some suggestions that the teachers then used to spur their thinking in regards to the new report card template. This instance illustrates that research can inform teacher's thinking and that they can use their own experiences and contextual knowledge to fill the gaps when research knowledge falls short of providing

solutions. As such, this discourse displays how educators do not need research to tell them what to do, but instead it can serve as a catalyst for innovative solutions to complex educational problems. In fact, educators could provide salient feedback to scholars about where holes exist in the research literature. Developing the report card format consumed much of the participants time during the last two meetings. The suggested format is located in Appendix F.

Participants' responses on the modified QURBI also displayed some information relating to the difficulty of this process of analysis and innovation. These data are outlined in Table 13.

Table 13

The Level of Difficulty Around the Analysis and Use of the Information Collected

Part of the Process	Very Easy	Somewhat Easy	Undecided	Somewhat Difficult	Very Difficult
Analyzing information from all of the sources	2 (33%)	4 (67%)	0	0	0
Developing new strategies based on the information gathered	1 (17%)	4 (67%)	0	1 (17%)	0
Considering how the strategies could be applied at our school	1 (17%)	2 (33%)	0	3 (50%)	0

The data shows that the participants found the most difficult aspect of the analysis and innovation process revolved around considering how their new knowledge could be applied within the context of Sunnyville. This illustrates the importance of having insider knowledge of the context in determining how to apply research knowledge. At Sunnyville, like other schools, there are logistical considerations, political relationships,

and the desires of an array of stakeholders to consider when making a change. Even when research provides a distinct solution, context has to be considered in its application. With the array of educational contexts that exist, this poses a challenge for educational researchers. Therefore, providing a space for teachers to innovatively apply the knowledge they have discovered is a salient endeavor that needs to be given more attention by educational leaders and scholars. In this instance, the Inquiry Team process provided such a space. Contextual factors and practitioner knowledge are both important pieces when considering the application of research knowledge in schools. All of those forms of educational knowledge (i.e., contextual, practitioner, research) have value and should be referenced when making educational decisions.

How is knowledge disseminated? How and when to communicate the Inquiry Team's activities and findings was a topic that the team considered at various times thought the process. To keep the head of school informed, the knowledge broker met with her at various times throughout the process. One of those instances was to review the results of the parent and teacher surveys. The head of school was very pleased by the parent survey, and perceived that it reinforced her position that the report cards should remain unaltered. A few weeks later, it was nearing teacher appreciation week and the head of school approached the researcher about having the Inquiry Team compile a sheet of paper with some of the positive comments from the parent survey to give the teachers in an effort to motivate them through report card writing season. The researcher told the head of school that she would take her request to the committee. This was their response:

Deanna: "I think it misrepresents the survey."

Karen: "I agree."

Deanna: “Here are the only things we heard from the parent survey, look how beautifully glowing the reviews are.”

Karen: “It skews the perception of the survey.”

Deanna: “Yeah!”

Cassidy: “Right and how does that validate the parents who took the time and gave what they thought was constructive criticism. Oh, we’re only gonna listen to you if you say something positive.”

Dan: “I do understand that the intention was positive but I do think it skews, that’s not exactly what this was.”

Knowledge Broker: “That’s a solid no on that one” (writes in notebook)

Cassidy: “I agree with Dan, that’s exactly what people don’t like about statistics and data is if your gonna skew it, if you’re only going to only extract what you hear, if your only gonna hear or select what you want to hear then what’s the purpose of the survey?”

Facilitator: “If you disregard all of the other feedback then that’s pointless.”

Cassidy: “Um hum.”

Karen: “I don’t know if I should say this but, I think it almost feels disheartening (looking down at her hands put together representing a pretend sheet of paper) to be like really, they liked everything about it. That’s all they would see, they wouldn’t get the whole scope of the survey.”

Dan: “Well, I guess when we share, we will give the whole scope of the survey.”

Cassidy: “Yeah and that’s the time and place. And it’s also the time and place to give it in the context of here’s the results of the survey, we’re gonna give you the whole scope of the survey, you know, positive and negative. It would be wrong for us to just highlight what we want it to say too…so we have to just give a balanced transparent view of it.”

This exchange displays the ownership the participants have over their work and the data they have collected. As such, they are extremely thoughtful about how the information is presented to their colleagues and the importance of an unbiased

presentation of the data. This illustrates possible identity development to encompass researcher attributes, which may indicate boundary crossing at the intrapersonal level. Dan and Josh worked together on the parent and teacher survey section of the presentation. According to their logs, they spent 2 hours and 30 minutes outside of the Inquiry Team meetings on synthesizing the survey results for the presentation. As a researcher, facilitator, and colleague, the researcher was amazed by the level of dedication they displayed because she knew just how hectic this time of year was for the teachers. It also illustrates the level of commitment teachers will give to something when they are passionate about it.

At the end of the year, all of the participants, including the knowledge broker, presented a slideshow to the faculty and head of school. The presentation walked the audience through the inquiry process that the team followed displaying the information we gathered and suggestions for future action. The participants and facilitator felt that it was important to communicate that the purpose of their work was to investigate a topic and present the findings to incite future discussion about the concept. The suggestions made in the presentation were by no means a mandate on what changes must be made. One question on the post QURBI did ask the respondents about the level of difficulty associated with presenting, and the Figure 13 displays the results.

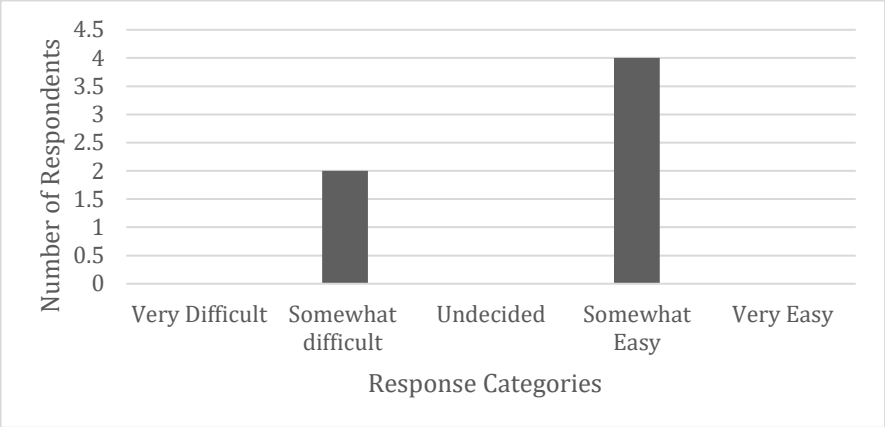


Figure 13. The level of difficulty associated with the presentation.

The data displays that most participants found presenting to the faculty and the head of school to be somewhat easy but some also found it difficult. The open-ended response results from the survey reveal some thoughts about what was difficult about presenting. Relevant responses include: the timing of the presentation was difficult as it was the end of the year, and some faculty were defensive and reluctant to change. During the post intervention interviews, the researcher inquired about the participants' experiences presenting and whether they received any feedback from those in attendance.

> Cassidy: "I think in general the presentation went well. It was pretty balanced. I think it showed that all of us had pretty much equal share in terms of the development of the project and that it had been a thoughtful process along the way. I think there was some push back right away from notably specialist because in our suggestions we were saying you know, we were taking into consideration that the total child should be evaluated, graded, for a lack of a better word and I think that the specialists started to panic because right now they are a very small part of the process in terms of grades and this would increase their workload substantially."

> Karen: "I think our presentation was really good, I think that it was really informative, I think that, again like I was saying before, with research it's hard to argue against it, here's what happened, here are the facts, here's what the parent's said, here's what the

> teacher's said, and here's what the research said. My own thought was that it went well. I think some people were defensive because it is a change, and they weren't necessarily a part of it but yet they didn't want to be. They could've and as much as they wanted to argue against what we were saying, I think it was hard to do so …I did hear some feedback that it went really well, I didn't hear a whole lot. The most of what I heard was after the meet when there was a couple of people who were pretty defensive and wanted to know more about it and were emotional in some ways about it."

> Dan: [responding to the feedback question] "Not a whole lot just because it was right at the tail end and everyone went their separate ways. I did have one person say in a text message that it was really good work and that they valued it and thought it was really well done. But other than that, I didn't really talk to anyone."

Even with the amount of consideration the participants put into presenting their information in an organized and unbiased manner, some of their suggestions were met with resistance. Others recognized their effort and valued their work. The head of school was quiet during most of the presentation and only spoke to give a minor critique about the report card's formatting, to reinforce how the parents like the current report card format, and to point out the positive comments parents had about the report card. At the end of the presentation, she did thank the participants for their work and mentioned that the conversation may continue in a professional learning community format in the upcoming year. While it would have been interesting to survey the faculty about the information presented, time constraints did not allow and it was not part of the original research design. Some faculty requested that the report card format and the presentation be emailed to out so they could examine the information more closely. In the end, the presentation and the work of the Inquiry Team did have its desired effect—it sparked conversation about the topic of report cards amongst the faculty and the

administration. Time will tell if that conversation will manifest any real changes to the report card.

RQ2: Did the Work the Inquiry Team Participants Engaged in Have Any Impact on Their Practice?

While the process introduced a new way to approach decision-making and problem solving at Sunnyville, the researcher then determined whether it had an impact on the participants' practice. When reviewing the meetings, one participant described how her practice changed due to participating in the Inquiry Team process.

> Alaina: "After doing all this, I really narrowed down what I wrote. I picked a couple of skills to kind of focus on unless the kid was a special case, I was short, sweet, and to the point…I felt better about it when I was doing it."

Post QURBI results also revealed some insight into whether or not the respondents felt their practice had changed based upon their participation in the Inquiry Team. These results are featured in Table 14 below.

Table 14

The Extent to Which the Inquiry Team Experience…

Statement	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Cased me to apply new strategies	1 (17%)	4 (67%)	1 (17%)	0	0
Helped me to change my practice about the topic	2 (33.33%)	2 (33.33%)	0	2 (33.33%)	0
Made little impact on my educational practice about the topic	0	0	1 (17%)	3 (50%)	1 (17%)

Table 14 displays that most of the participants report their practice was impacted by the Inquiry Team experience. The details of that impact are largely unknown by the

researcher. The undecided perspective may be a result of the report card not being permanently changed and the need for more work to be completed in the following year. While some members of the group may have associated some changes in their practice or thinking with their participation in the Inquiry Team, research would need to continue to see if the work of the Inquiry Team was a catalyst for changes amongst faculty in the larger Sunnyville community. To learn more about the Inquiry Team's possible impact, the post interview questions inquired whether the participants felt they would have arrived at the same result if they did not participate in the process. Here are their responses:

> Dan: "Not exactly, I think that piece of the research for me personally was eye opening with that comparative part…I don't know if we would've come up with that without having done this whole Inquiry Team process."
>
> Karen: "No definitely not. I mean if you think about how it was brought up in that small group at Sunnyville council…from what I was told, it just went around and around and around and around and people voiced their concerns and said that they didn't like it or that there were things that they did like but not based on anything, there was nothing to support it, to validate it, to say like we did, here are the surveys that we did, here's the research that we had, you can't really argue with that so no I don't think anything would've really come about if we hadn't have done this."
>
> Cassidy: "No because I mean at the council meeting... our current administration, basically [head of school], thinks that the long narrative, that parents love the narratives, she thinks they're a huge selling point. She thinks they should be done and she gets enough positive comments on them that, my feeling is that she thinks that those positive comments outweigh the teacher's concern that they are not the best way to communicate information. So I don't think any change would've happened, it would've been kind of like well this is the way we do things it's not broken, so let's not try to fix it. And I don't think that the faculty's voice would've ever surfaced to the point it has… so I think it was just a way to open up different perspectives."

When analyzing these comments, the Inquiry Team enabled Dan to expand his thinking about the topic of report cards- an intrapersonal level change. Karen and Cassidy have been faculty at the school longer than Dan, and they focused on how the process was a catalyst for change at an institutional level. While short-term changes were indicated by the data, it remains to be seen whether a long-term multilevel boundary changes will occur and if the ones that have surfaced in the data collected here will sustain.

RQ3: What is the Role and Some Characteristics of a Knowledge Broker in Educational Settings?

The role of the knowledge broker is often suggested but not detailed in the education research literature. As such, a goal of this study was to develop a clearer understanding of the role of the knowledge broker, their experiences, and some characteristics that influenced the Inquiry Team. The role the knowledge broker assumed in the Inquiry Team was analyzed through the video recordings of the Inquiry Team meetings, the knowledge broker's journal, and the activity log. The data collected were organized into three categories—skills, knowledge, and attitude—which the researcher derived from the work of Mallidou et al. (2018), who researched knowledge translation in the medical field.

Skills. Mallidou et al. (2018) outlined many competencies that fall under the category of skills. One such competency is the knowledge broker's ability to lead. In this study, much of the knowledge broker's leadership abilities were evaluated in relation to the tasks she engaged in. As such, the knowledge broker's activity log was studied and the activities were categorized. Four major themes emerged from the categorization: planning, meetings with the head of school, tasks for the Inquiry Team, and email

communication. Table 15 outlines the types of tasks that fall under each category and the amount of time devoted to those tasks.

Table 15

Knowledge Broker Tasks

Category	Tasks	Time
Planning	Gathering resources, reading about facilitating, creating documents, writing a plan for the meeting, creating PowerPoint presentations, making copies	15 hours and 30 minutes
Head of School	Meeting with the head of school about the topic of report cards, surveys, final presentation	I hour and 16 minutes
Tasks for the Inquiry Team	Uploading resources on the group space, working on surveys, transferring surveys to survey monkey, getting books/articles for team members, report card formatting, presentation formatting	17 hours and 25 minutes
Email Communication	emailing the Inquiry Team members agendas and details, emailing the head of school, emailing the faculty surveys	4 hours and 5 minutes
Total amount of time	All Tasks	38 hours and 16 minutes

The table outlines the array of tasks that the knowledge broker engaged in and the amount of time she devoted to the role in addition to the time spent facilitating the Inquiry Team meetings. The majority of the time was spent on completing activities for the Inquiry Team before each meeting. This was often done to minimize the amount of work the participants would have to engage in outside of the Inquiry Team meetings. As a facilitator of the Inquiry Team meetings, the knowledge broker performed specific tasks. The first was getting the meeting started, keeping the conversation focused on the topic, and concluding the meeting on time. When reviewing the videos, the knowledge broker often began and ended each meeting taking care of logistical items such as passing out materials, sharing resources on the online space, answering individual participants'

questions, or assigning tasks for the members to complete before the next meeting. During the meeting, it was important for the knowledge broker to keep everyone focused and to keep the meeting moving. Participants could get distracted with nonsensical off-topic conversations like whether they allowed their students to eat their chips out of a bag or if it was too noisy. Other times, the conversation became quite philosophical, and the knowledge broker would need to bring it back to discussing the current context and grounding the work in things within their influence. The conversation featured below is one example:

> Cassidy: "I mean there are colleges that don't do grades, it's hard if the high school doesn't do grades, it's hard to work into the current system when applying for college…"
>
> Knowledge Broker: "Some might argue that they are all inflated anyway"
>
> Alaina: "Did anyone read a *Century of Grading Research* besides me?"
>
> Group: "No."
>
> Alaina: "So basically, it says that grades are boloney because teachers put in their own biases based on so many different variables. That historically grades have only been there for college and advanced placement. It's the only way they saw any value."
>
> Knowledge Broker: "So, I think that will be a bigger Sunnyville philosophical debate…"

Although the Inquiry Team meetings provided a venue for philosophical discourse, that no other professional development structure at Sunnyville fostered, the time restraints caused the knowledge broker to have to temper them after a while. The knowledge broker also taught the participants how to read, access, and analyze research; create surveys; code qualitative data; and analyze the problem.

The post QURBI results explored how adept the knowledge broker was in these areas. The results are included in Table 16 below.

Table 16

A Measure of the Knowledge Broker's Effectiveness

Statement	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Expanded my knowledge of reading research	3 (50%)	2 (33%)	1 (17%)	0	0
Expanded my knowledge of how to access research	2 (33%)	4 (67%)	0	0	0
Expanded my knowledge of how to access research	2 (33%)	3 (50%)	0	1 (17%)	0
Was prepared for Inquiry Team meetings	5 (83%)	1 (17%)	0	0	0
Helped me to access the resources I needed	4 (67%)	1(17%)	1 (17%)		
Was knowledgeable about utilizing research	5 (83%)	1 (17%)			

Most of the data from the survey were positive, although the results also displayed some areas where there could have been improvement.

Knowledge. Mallidou et al. (2018) discussed how the knowledge broker should have an understanding of the context. Although the knowledge broker was a faculty member of the school and she did possess much knowledge about the context, there were some pieces of information about the participants that could have better informed her work. A prime example is how the knowledge broker could have had a clearer understanding of the participants' level of comfortability with finding, reading, and

applying education research prior to the start of the Inquiry Team meetings. This knowledge is salient as it would have given the knowledge broker an idea of who may have needed some more skill development around research acquisition and use. When reflecting, more time should have been allocated to helping all of the participants to access research. It was a task written in one of the plans for the fourth Inquiry Team meeting; however, the team ran out of time and never circled back to that skill. In the post interview, Dan's comments supplement the data above and showcase the need for more focus on this area.

> Dan: "It's always just in the interest of time. It would've been nice to be able to do some of the research, actual like searching the databases together…For example, when I was having trouble finding things on narratives, I could sit with someone and say is it something that I'm doing wrong technically or are you not finding something either? But then again that would be another meeting after school and time that we don't have."

At the end of the Inquiry Team experience, the team was asked to gather together on their own to provide feedback for the facilitator. They provided the following suggestions for how to improve the role of the Inquiry Team facilitator: "Be ready to change direction if research is unavailable and remain mindful of the facilitator's role within the school and how it may or may not impact the team (make sure the administrator is on board with the work and/or process)." The knowledge broker did often encourage participants to keep looking for research when it became challenging by providing phrasing suggestions or by trying to find resources herself. Perhaps these efforts did not alleviate any frustrations felt by the participants or perhaps they were not finding the time they devoted to researching report cards fruitful. To gather more

information about the second piece of feedback, one of the participants was asked about the comment in the post interview. This was Karen's response:

> Karen: "So, one of the things that we talked about was with an inquiry group the facilitator is really important and who within the school is in a position where their as knowledgeable as our facilitator was, who has knowledge of research and knowledge of best practices, and just the demeanor that bring people together and wants them to participate in something like this and also the political aspect of it. What person, is it just a classroom teacher, is it somebody who is a little bit higher up? Would it ever be administration? Would that be too tricky with administration? We talked about how your role, that you were the facilitator and had that sort of middle ground between your kind of in administration where you kind of worked with the head of school a lot but you were also on the ground level with teachers. It was a nice bridge between a nice little gap. But we did say, and it could be just based on who the administrator is, but we did say it would've been very different if an administrator would've been there. And us not having to go and talk to her… you bridging that gap for us I think really helped and we just thought about in another school setting, who could that person be? I guess it would be different at every school, it would have to be someone with a certain personality and a certain role, and somebody who is trusted and knowledgeable in the field. "

Karen's response was not what the knowledge broker expected to hear when asking the question. Before asking Karen, the knowledge broker thought that perhaps her position hindered the success of the group instead of supported. Karen's articulation of the group's analysis raises many salient questions concerning the position and background of the knowledge broker and how that may hinder or help in their ability to understand the complexities of the context. To be able to span the boundary between research and practice, the knowledge broker in this instance benefitted from her experience with both. As a doctoral candidate, the knowledge broker has a comfortability with engaging with the research community. In the focus group, the participants noted that the fact that the knowledge broker was "knowledgeable about the research process

without being condescending." The knowledge broker was pleased to read this feedback as she made a conscious effort to achieve this goal. This may have been aided by the knowledge broker's role as a practitioner as it enabled her to relate to the teachers. Lastly, as the learning specialist, she interacts often with the head of school which provided her with some experience in that realm. The participants also bring up a salient point about the need to ensure the administration is on board with the Inquiry Team's investigation. In retrospect, this is an area the knowledge broker could have improved. This alludes to one of the most difficult aspects of the knowledge broker's role in this context: navigating politics.

It was very important for the knowledge broker to inform the head of school of the inquiry process and the work of the team. This work began early as the head of school was informed the year before the study began. The head of school also attended the presentation to the faculty about the Inquiry Team study and the possible topics. In addition, the head of school was informed again during the pre-intervention interview before the Inquiry Team began meeting. The conversation is featured below:

> Knowledge Broker (KMB): "So, in the spring I asked the faculty to just give information if they had something they wanted to learn more about. We had those four categories I presented at that faculty meeting. I'll just read them again. They were: Small group reading instruction, school culture (like the hidden curriculum, student behavior,) reporting student progress (record keeping, student portfolios, providing feedback, progress reports) mindfulness. Did you have any thoughts? What did you think about the topics that were the most prevalent that they came up with? Did you have any…"
>
> Head of School (HS): "They came up with those topics?"

KMB: "Yeah, so they were the most prevalent. Were any of them surprising?"

HS: "Not surprising, actually to be honest, I'm buoyed by this because I feel I often bring up topics like this, these topics that they picked, and sometimes I feel like they're not really interested in them….I love to constantly learn and I don't want to be at a school that's not. And I know how easy it would be to not have a focus like that, and to have everyone one Wednesday a month instead of two Wednesday's a month where we talk about something. I know how easy that would be, but I don't want to be at a school that doesn't want to keep learning. So, I thought that these were really great topics that are important and it's nice to know that there are people in the building that want to get better. And I think that's what separates us from a lot of schools."

[Later in the interview]

HS: "Which one did they…"

KMB: "They chose the reporting student progress."

HS: "I love where we're going, the direction we're going with the PAST test (Phonemic Skills Awareness Test) and the MAC (Math Assessment Chart), because I think that's so clear, and I did share that with parents at a parent coffee and the parents were blown away by that. That's the sort of thing we are doing, they were like "wow, we had no idea" and which I think is so cool. The one that I think we just constantly need to do more of is that mindfulness piece. Just because I just see it more and more and kids are getting younger and younger with this putting pressure on themselves to be great and to be perfect and that's a long road ahead."

This interview displays how the head of school was notified by the knowledge broker about the topic voted on: reporting student progress. It is interesting to note that she never discussed report cards or reflects on what the teachers might want to discuss in that category, instead she discussed what the school already does well from her perspective.

At the first Inquiry Team meeting, the participants decided to focus on investigating report cards. When the head of school learned of the topic that the Inquiry

Team decided to investigate, she communicated some concerns she had in having the report cards examined by the group. This is an example of a typical situation in schools wherein faculty and administrator priorities differ. The knowledge broker's skill set should include being sensitive to the perspectives of different stakeholders while still trying engage everyone in identifying common goals. It is important to note that the head of school took a risk in allowing the Inquiry Team to continue their work, knowing that it may result in recommendations from the group that did not align with her or other administrators' report card preferences. Similarly, it is also salient that as an administrator, the head of school may have to consider more factors or stakeholders when making changes than might be foreseen by the teacher participants.

In addition to meeting with the head of school to ensure she felt informed and her perspective was heard. The knowledge broker also had to ensure the teachers were comfortable with the head of school's uncertain level of support. To that end, Cassidy asked a poignant question:

> Cassidy: "I guess we didn't really have any guarantee with this when we started, there's no guarantee to us as an Inquiry Team that whatever suggestions we come up with will be ratified or accepted…She's (head of school) listening to it, she's open to it but there's no promises that if we come up with a way even if the group determines that it's a better, cleaner, faster way there is no guarantee that it will be accepted. Correct?"
>
> Knowledge Broker: "Correct."

It was painful for the knowledge broker to have to answer this question, and she was unsure of how the participants might respond. To her amazement, they decided to continue their work even though there was a chance their efforts would be futile. The knowledge broker has a responsibility to provide a venue where participants could share

their insights and recommendations and to advocate that their work be shared in the hope of informing school wide decisions. Throughout the experience, the knowledge broker had to navigate the political landscape of the school and keep all of the stakeholders in mind with each decision and each communication. At times, challenging decisions had to be made but she aimed to be transparent as much as possible.

Political navigation was one of many challenging tasks that the knowledge broker had to engage, perhaps because she knew the context so well. Despite the participants indicating in the focus group that they found the knowledge broker to be good at delegation and project ownership, it was something the knowledge broker struggled with often. It was difficult to know at times, how much knowledge to disseminate to the group and how much of a participatory role should she assume. The final presentation was especially difficult for the knowledge broker. Some slides were better prepared than others and it was difficult at times for the knowledge broker not to take over. This excerpt from the knowledge broker's journal illustrates just how many challenges she sometimes faced at once:

> I am working on planning for the next session. What is the most difficult aspect, is trying to figure out just exactly how much to plan. I feel as though the first session went well but I'm not quite sure how long going through different pieces of information that was collected and working on surveys will take. My concern is that it will take longer than an hour and then we will be pushing activities into the next session. This could impact the amount of activities we accomplished overall. I have spent the night collecting information to help the team members create a survey. I have concerns about the ability to facilitate a group creating a survey together. My concern is that there'll be lots of different ideas and contrasting views and it may be difficult to complete the task in an orderly and timely manner. I have written down steps I think we should take that I hope will help the process however I'm not quite sure how it will go, which makes me feel uneasy. I just do not want everyone to get frustrated and for there not to be a product. I also wonder if I am making the process to technical by looking at information from universities about making surveys. I want

> the surveys to be good and not biased; however, I don't want to overwhelm the members with information they really don't need. It's a fine balance.

Sometimes, this fine balance was not achieved. As a result of many factors, the participants would be stressed at times. This stress mainly stemmed for being asked to do something new or not having enough time in between meetings to accomplish everything they wanted to. Below is an example of such an instance and the knowledge broker often used humor to diminish feelings of stress.

> Knowledge Broker (KMB): "Don't stress about coding Josh, it's okay if it's not done. Don't stress Josh.
>
> Karen: "He's stressed."
>
> Josh: "Okay, so I did it wrong the first time."
>
> Aliana: "I did mine in Excel the first time."
>
> Josh: "…And then I checked, I did tallies. (flipping through pages) alright."
>
> KMB: "Oh no, Josh."
>
> Josh: "I'm a little stressed today."
>
> KMB: "Don't stress out. Eat something Josh."
>
> Karen: "Yes, chocolate."
>
> KMB: "I do not have anything stronger than chocolate."
>
> Josh: "My articles are not research based. "
>
> KMB: "That doesn't matter, that's totally fine."
>
> Josh: "They're also not coded."
>
> KMB: "That's okay."
>
> Karen: "Coded?"
>
> KMB: "1, 2, 3, right Josh?"

Deanna: “I don’t even have articles, Josh.”

KMB: “Don’t stress out. I don’t want this to be stressful. So whatever you accomplish, you accomplish, whatever you don’t accomplish, you don’t accomplish and it’s okay. All is well. All is well. Don’t stress out. No shame here. You’re here.”

The knowledge broker had to ensure the teachers did not become too stressed or overworked with tasks in between meetings; however, she had to also hold them accountable in some ways to ensure there was equitable participation and so the group could continue to move through the process. This was a difficult balance to strike, which might have been less pronounced if the team could have been part of the professional development offerings instead of an added commitment, as was the format originally intended.

Attitude. Not only does the knowledge broker have to be able to handle the number of tasks and challenges**,** but they have to be able to engage participants in a collaborative process that is not easy or familiar. Mallidou et al. (2018) outlined how valuing teamwork, inciting trust, and displaying confidence are all important competencies that comprise the attitude of a successful knowledge broker. In this study, characteristics of the knowledge broker’s attitude and demeanor were factors mentioned in the analysis of the role and expand upon the work of Mallidou et al.

The focus group mentioned the knowledge broker’s “calm and supportive demeanor” helped with the process. In addition, they mentioned the knowledge broker’s ability to listen and they appreciated her input when it was given. When watching the videos, it was noticeable just how little the knowledge broker did speak during times of continued discourse. If she did speak, it was often to mirror back the thinking of the

participants to ensure she that was understanding their perspective or she would engage participants who did not yet have the chance to share their ideas. Table 17 below includes some results from the post QURBI survey that outlines some characterizes of the knowledge broker.

Table 17

Knowledge Broker Characteristics

Statement	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Encouraged collaboration	6 (100%)	0	0	0	0
Was available when needed	5 (83%)	1 (17%)	0	0	0
Challenged my thinking	3 (50%)	2 (33%)	1 (17%)	0	0
Was approachable	5 (83%)	1 (17%)	0	0	0
Cultivated trust	5 (83%)	1 (17%)	0	0	0
Encouraged me to share my thinking	5 (83%)	1 (17%)	0	0	0
Made the experience enjoyable	5 (83%)	1 (17%)	0	0	0
Made me feel like a valued member of the team	(6) 100%	0	0	0	0

The participant's perceptions of the characteristics listed above showed that the knowledge broker was able to cultivate a culture of collaboration, trust, and knowledge-sharing. It was important for the knowledge broker to make the experience enjoyable as everyone was volunteering their own time and they were with colleagues they do not typically collaborate with. When watching the videos, there was a lot of laughter and the sharing of experiences, which brought the group closer together. Comments were also included in the survey that expanded upon the information above.

> "…Staying on task and achieving goals while also listening thoughtfully and allowing for directional changes is not an easy balance to find. [the knowledge broker] did it seamlessly. She was enough of a leader who helped to guide us as she was a facilitator who allowed us to forge our own path… "

> "…She [the knowledge broker] was very kind, encouraging, and open to suggestions. She listened to all members of the team and worked tirelessly to make our work meaningful and the process a positive experience for all team members..."

When trying to cultivate trust and encourage practitioners to take risks, demeanor cannot be over looked as a salient factor that influences the success of the group. Calmness, open-mindedness and a willingness to listen appear to be useful characteristics. Such features can be particularly helpful when there are moments of conflict. In this experience, much of the conflict that the knowledge broker endured was in navigating the differing priorities of the Inquiry Team and the head of school. The knowledge broker reflects on one such occurrence when she informed the head of school that the Inquiry Team participants did not want to compile a page of positive quotes from the parent survey about report cards.

> … Knowledge brokers have to be okay with potential conflict and making people upset at times. They have to know what the "right" thing to do is and be able to defend that. It is not easy.

The reflection shows how the knowledge broker has to have a clear understanding of her role as an advocate. As such, she or he would need to be able to stand up to stakeholders when those values are being challenged. It is important to note that this is an example of the knowledge broker advocating on behalf of the Inquiry Team members, but there were other instances when she would advocate for the head of school's perspective as well—such as including her feedback in the

creation of the teacher and parent surveys. In this context, the knowledge broker had to take actions to support fairness amongst stakeholders.

RQ4: Did the Inquiry Team Intervention Create Opportunities for Multilevel Boundary crossing Amongst its Participants, Between Educational Research and Practice and Other Stakeholders?

The paragraphs that follow outline data from the Inquiry Team intervention supports the assertion that multilevel boundary crossing did occur on an institutional, interpersonal, and intrapersonal level (Akkerman & Buining, 2016). Before the Inquiry Team intervention, the context did not provide a space for teacher led decision-making or collaboration across grade levels. This is largely illustrated in the interviews conducted before the Inquiry Team process began.

Changes at the institutional level. Inquiry team participants and some non-Inquiry Team participants were interviewed to gain an understanding of current practices and organizational structures before the onset of the intervention. Many of the interviewers describe collaboration as happening "on the fly," and cited that there is not a lot of time that is allocated for collaborating across grade levels. Here are some responses when the interviewees were asked about their collaboration practices.

> "All the time, in (grade) that's pretty much what we do…We week to week meet with one another and touch base as a team…A lot of looking at calendars, it's really logistics, we all have our planners open and we're saying what date is this, what works for everyone in terms of that. Like I said the curriculum is pretty much set, so It's not a whole lot of what do we want to do next…"

> "…. I definitely collaborate with the K1 and 2 teachers. I also collaborate with art, music occasionally and I do stuff parallel to grades that I know their working on or grades that I know what they're doing and I can do something in here that supports what they're doing, but it hasn't always been reciprocal. So then I do what I do because its best for the kids and in some cases that's all that it is. There's no real collaboration there but I'm supporting what I know that their teaching."

This idea that there is support for what their colleagues might be teaching was found in other interviews as well. They often mentioned that there was not much collaboration across grade levels and that collaboration was often impleaded by a lack of time or sometimes the personalities of their colleagues.

> "…. It's hard to cross the grades here. I feel like that's become less and less almost. … As much as we try it seems to be … you know we also used to collaborate across schools, we don't do that at all…."

> "…I mean attitude is certainly you know, when I try to collaborate and haven't felt the equality and effort put forth towards something. I've tried more than once, and when it's just not there, I'm not gonna keep beating my head against the wall when it's not reciprocated.…and then scheduling is another piece. Cause a lot of the stuff I do with art is in the hallway, Oh hey we need to da da da da…"

> "I'd say you know just human nature in terms of like sometimes working with someone else can get a little competitive or who does what. Little things like who is going to cut out this lamination or making sure we have different things done at different times. I think just making sure that your realizing that it is all for the same goal. There is nothing competitive about it…"

The head of school describes the overall collaboration structure at the school.

> Knowledge Broker: "And that's with the whole faculty. They have a faculty meeting on a Wednesday and then the Wednesday after that…"

> Head of School: "Is usually a study of something. So, this year we have, the past 5 years, it's been the same topic for everyone, and like I said earlier the specialists don't always fit into that mold. I wanted to make sure everyone had a project this year so we're doing PLCs where 2nd-5th grade teachers are doing something, 1st grade teachers are doing something, specialists are doing something, PreK and K are doing something. I think it's a little more tailored and differentiated which is what I ask the teachers to do in class anyway."

> Knowledge Broker: "Within the structure of the school day, are there opportunities for teachers to collaborate or are there

other collaboration opportunities within the framework of the school week or the cycle?"

Head of School: "There are opportunities for each grade level to meet. And there are opportunities for the specialists to meet once a cycle also. But there isn't an opportunity for classroom teachers and specialists to meet, so maybe I should put that into faculty meetings and stuff like that. People do though, they find it because they are professionals and its always amazing to me what does get connected."

At Sunnyville, there are structures in place to allocate time for collaboration; however, not much time is given for teacher to collaborate across grade levels. The professional learning communities are more tailored; however, many of the topics the groups studied were chosen by the head of school. In contrast, the Inquiry Team provided a space that enabled teachers across grade levels to collaborate. Once this change at the institutional level occurred, then the interactions the participants had helped them to cross boundaries at an interpersonal level.

Changes at the interpersonal level. One of the participants explained in a post interview the experience of collaborating with their peers across grade levels.

> Dan: "It helped me to see, to get a little peek into the world outside of (my grade) and to see the bigger picture. It was nice to see not only the challenges other teachers have but also the successes that are similar across grade levels. Yeah, it helped me to see from a broader perspective and to talk to people in a broader way."

The open-ended space on the QURBI also provided some data about collaboration.

> …"we were able to have honest conversations with colleagues who we didn't normally collaborate with on a daily basis. …I was excited to participate and I felt comfortable speaking up when I am normally reserved and quiet in whole group meetings."

On the QURBI participants also were asked whether the Inquiry Team experience encouraged collaboration with their colleagues, and 100% of the respondents agreed

strongly that it did. When examining the videos, it was often the collaborative discourse that enabled the participants to dissect a concept more deeply.

> Facilitator: "Does anyone have any articles they want to share by the way?"
>
> Karen: "This one you were just referencing about grades is about intrinsic motivation in elementary school. It's just about math grades and it was done in Germany and … when I went through the conclusion and recommendations, the last sentence it says that "the results indicate that intrinsic motivation for school based learning does not necessarily suffer in the face of suboptimal grades." So even though they get a grade that isn't great, that doesn't mean that their intrinsic motivation is harmed by that. That's just in math and it's just in this one German setting. I thought that was interesting because other things I have read have said the opposite."
>
> Josh: "I wonder how many long-term."
>
> Karen: "It says longitudinal."
>
> Josh: "Like how many bad grades could you get."
>
> Karen: "That's a good point before it's just like, "I'm done."
>
> Josh: "Is it just one or two bad grades, you could have ten bad grades in a row."
>
> Deanna: "That's hard because there's so much of an environmental factor there. It depends on how you family is."
>
> Karen: "And the culture of the school is… "

In this example, collaboration at the interpersonal level enabled participants to cross the boundary to interact with research literature and to deepen their thinking about what they read. It is through collaboration that teachers were able to analyze and critique research as displayed above. It was through collaboration that they were able to create surveys and analyze the data. It was through collaboration that the participants created a solution to their problem. The Inquiry Team experience was strengthened by

collaboration amongst a group of people with diverse perspectives and who had developed a commitment to the groups established norms. Collaboration also helped to foster a sense of empowerment in the participants.

Changes at the intrapersonal level. The knowledge broker observed behaviors in the teachers during the Inquiry Team meetings that would suggest changes were occurring at the intrapersonal level. Boundary crossing at the intrapersonal level was suspected to involve possible changes to teachers' identities as they take on researcher attributes and an altered belief system. An unforeseen outcome of the Inquiry Team intervention was an increased sense of empowerment amongst the participants that was reflected in the data. The concepts of empowerment, identity formation, and beliefs are explored in the data presented in the paragraphs that follow.

Increased sense of empowerment. It was interesting to see how early it manifested and by the second meeting it began to surface.

> Cassidy: "[the head of school's] comment to council was that well the report cards aren't going to change. They're not going to change at all. And so then [the knowledge broker] and I just kind of gave each other a look like oh well, maybe they are because we're doing all this work, you know what I mean."
>
> Knowledge Broker: "…We were walking and I said you know I apologize, hey look I didn't get a chance to talk to you about this and I said let's set up a time to talk about what we did at the Inquiry Team meeting. And so, she said that she basically doesn't want to throw the baby out with the bath water is what she kept saying to me. I just think it needs tweaked, I just think it needs tweaked. I said okay, we'll talk about it…"
>
> Cassidy: "Can I just jump in here. You don't base your report card system and your reporting system based on the head's preferences."
>
> Alaina: "Yes"

Cassidy: "You base your report card system and your reporting system on what is the best reporting system for the teachers and the students and the parents and head's preference might get a little bit of a vote but not 90% of the vote."

This sense of empowerment manifested at other points throughout the experience. The concept was solidified when as a focus group, the participants identified that the group felt empowered because they felt valued, perceived that their voices were recognized, and believed that the process evoked a possibility for change. To have a better understanding of this the participants were asked to explain this feeling of empowerment:

Dan: "I think it felt like you found your voice to be able to say something about something that is so important and impacts us so heavily. It was nice to be able to be a part of the process of not only discovering what could be done but also presenting that and sharing that out with others and seeing them kind of get interested too."

Karen: I think that relates to using research because in order to use the research I feel as if you would need, whatever decision your gonna make you would need a team to do that. So, instead of top down decisions where whoever's in charge comes in with whatever knowledge they have and whatever background they have and say this is what is going to happen. But by putting together a group, that was in our case voluntary and really had a vested interest in it, it felt like we were impacting change like we were more knowledgeable, like we could reference research as teachers. It made us feel more validated and I think, important. Like our decision really mattered."

Cassidy: "Well I think you know, especially in a small school organization, again I mentioned it earlier, often times decisions are made top-down from administrators to teachers and we at [Sunnyville], until recently, have had one administrator so you know one person is imposing changes or new curriculums or new ways of doing something on a faculty of 39. And with or without any kind of research based decision-making. So this way I think, not that the decision is going to change or the grading process is necessarily gonna change, but at least if it does change I think that definitely the participants in the study as well as the broader based faculty would feel like it was you know a bottom up grown idea rather than a top-down imposition."

The Inquiry Team experience had seemingly cultivated a sense of empowerment because utilizing research enabled the participants to have support for their decisions and assertions. Secondly, the participants felt that it disrupted the top down hierarchal administrative structure of the school and it enacted a process to make informed researched-based decisions. All of these experiences appear to be counter cultural. The head of school's interview prior to the intervention can shed some light on how decisions were typically made at Sunnyville.

> Knowledge Broker: "What informs your thinking when you make education decisions about what happens here at school?"
>
> Head of School: "A number of things, my first and foremost is usually what's best for the children. When deciding what programs to bring in to a school setting, you know I've had that experience a couple of times, I find out what expertise that people have at the school that we currently are at, and then what their needs are. So then, because I've been at 6 different schools, I've had the experience of "I've seen people do that" or "I've tried that before." So I do that. When we talk about like a new curriculum, we will think about other curriculums, we will spread them out to see what's there. In the case of our school recently though, it seems like we've had, we already know, we don't have to do as much research as we have done in the past with like 6 different math programs. The research has sort of been done for us, in a lot of times, sort of just trying to take the learning where it needs to be. What I also do is I sort of collect experts, so I, when I find an expert in math I sort of hold onto their information and pull them up, because I think teachers like to hear from the experts and not just me, because I don't have that expertise or something like that. So pulling in the experts and talking about the program I think helps the teachers appreciate it a little more."

Somewhat of what is described by the head of school runs counter to the experiences described by the teachers. As previously reported, they felt as though decisions were

made in a top-down manner and they never mentioned being asked their opinions about programmatic changes.

The head of school described experts as people from other schools she has worked, from conferences, a collaborative group of heads of school in town, and from online community groups. This was important to clarify because the researcher was not sure whether she was referring to scholars, but she was instead speaking of a network of practitioners she has developed. She is also asked to explain what she means by "the research has already been done for you."

> Head of School: "Well just, with something like writing workshop, we sort of just go right to the best, Teachers College if you will. I've been through enough experiences with this sort of one off, "Oh you know I just went to the workshop for one day." When we look at reputation of a program and finding peoples experiences, we really rely a lot on word of mouth from other schools. This has been just incredible for our program. And what we'll do usually is send like a few test teachers to the program and go. "Yeah, this is it."

It is important to note that the teachers have never mentioned being asked to test a program or to observe its use. Again, the practices suggested here seem to run counter to the descriptions of the decision-making processes described by some of the teachers. The next statement almost seems contradictory to the information provided above, as the head of school described how she does the research because the teachers are busy.

> Head of School: "When I hear something then I'll research it too, and I will go online and I will call companies for materials and stuff and say "Let me check this out." So it's really important to me as a leader of a school to stay current with that stuff too, because I think the teachers have so much on their plates that they might not have time to do that research so I'm constantly looking at it too."

Knowledge Broker: So of all of the resources that you have mentioned, what do you think has the greatest influence on your thinking?

Head of School: To be completely honest, I think the reputation of the work. I like to think of the best practices in elementary education, so when I hear that this is a cutting-edge program or one that has been tried and true for many years, that's what I look for, to be honest.

Although the head of school never claimed to be the sole decision-maker at Sunnyville, there are some facets of this exchange that do showcase a decision-making process that is largely based on word of mouth and the experiences of the leader. Additionally, it was assumed that any information or program from what the head of school considers to be a reputable source, that those institutions have conducted the necessary research already and there is no need to critique it further. Furthermore, if the work is historically used or cutting edge, then it too is adopted. These are the kind of practices that reinforce the gap between educational practice and research. These are the practices that the Inquiry Team Model aimed to circumvent.

In the post interviews, some of the Inquiry Team participants were asked to compare how decisions were made historically to the Inquiry Team experience.

Dan: "…we actually had the research to back up what we were saying instead of just people talking. I have noticed in my experience when we're trying to solve a problem, it's just a lot of talk back and forth with nothing concrete to back up what your opinion is other than you know your experience which is very valuable of course but to actually have like hard data is nice- like the survey and the numbers and the comments that came from people and an actual professional article that says like other people are saying this too, it is not just something I am feeling, it's not just my opinion. I think that is the part that made it seem more valid and easier to present to others too because we had back up."

Karen: "… I never quite know how a decision is made and I wouldn't just say it's just at our school, I would say at most schools. I think it's

> usually based on trends or it's based on what people know, what they've experienced in the past. But in my experience at least I don't remember a decision being made because it was based on research and doing so allows you to take away a little bit of personal interest, or vested interest, or bias because you can look at the research and you can say this is what worked and this is what hasn't and it feels more concrete… it feels more sound.

> Cassidy: "I think that the whole process would serve as a nice model for implementing a bit of change, I mean oftentimes we have, not just in our school but I think a lot of schools, theirs top-down decisions that are made for a variety of reasons. Now not to say that there isn't some kind of inquiry process that goes into it, into the decision but as teachers we aren't always aware of what that process is. So this was an imperfect process… I certainly think this process was a more thoughtful way of implementing change. If indeed change comes about with it. Was it fool proof or perfect, no but I think it was a step in the right direction."

Again, it is interesting to note that the teachers seem to have no idea how decisions are made. Karen and Dan's assertions that it is often based on experience were in alignment with what the head of school reported. Additionally, all of the respondents felt there was value in crossing the boundary to engage with research and it gave them the information they needed to push back against the leadership hierarchy at the school who was content with leaving the report card format untouched largely because of experience.

There were times when some of the participants would lose their sense of empowerment. At these moments, it was observed that the Inquiry Team members or the knowledge broker would reinforce a sense of empowerment. Here is an example when the participants are working on the final presentation.

> Cassidy: "Where are we coming in with the report card? Not until after this?"
>
> Knowledge Broker: "You're after the survey."
>
> Cassidy: "So they're all uncomfortable and we're gonna lay that on them?"

Dan: “That’s what I was just gonna say!” [laughter]

Cassidy: “That should go over well.”

Dan: “After everyone looks very terribly uncomfortable and heated up.”

Alaina: “I think it’s important to note that this is a research project, this is just something we all volunteered to do out of interest…we aren’t beholden to this.”

Karen: “We don’t have the authority.”

Knowledge Broker: “We’re not dictating that anything…”

Cassidy: “No, I know, you know what we’re saying.”

[Later in the conversation]

Dan: “I mean I wonder if she [head of school] thinks it’s going to get the faculty riled up on one of the last days, I don’t think it should have that effect, that’s not our intention but I don’t want it to either- you know. “

Knowledge Broker: “I think that if you’re gonna grow, I don’t think you can necessarily shy away from some conflict.”

Karen: “We have to lean into discomfort.”

Dan: “I agree.”

Knowledge Broker: “I think that’s how you grow right, if you don’t ask those burning questions that’s how things get staying the same for 30 years in our field.”

Alaina: “Right.”

Knowledge Broker: “Because no one wants to make anyone uncomfortable and I think it’s okay.” [for things to be uncomfortable sometimes]

This excerpt shows how both the knowledge broker and other Inquiry Team members empowered the participants to engage in some tough conversations that

may come about due to the information they were presenting. These moments did not happen often, but they illustrated the importance of working as a group and highlighted another role of the knowledge broker.

Changes to participants' identities. Although the knowledge broker was able to observe the participants' display moments of empowerment early in the Inquiry Team process, it was unclear whether they had any identity changes to encapsulate researcher qualities on an intrapersonal level. When analyzing the videos of Inquiry Team meetings, there was evidence of scholarly thinking. It could be observed when they debated over word choice to ensure survey questions were clear and unbiased, when they questioned if an article was research based, and when they critiqued the generalizability of findings or the strength of a scholar's argument. Another example is when the participants were about to complete the teacher survey and one of the participants thought to ensure every factor of the problem was addressed.

> Karen: "Can I just ask about two more things? I'm looking at this [waves fishbone diagram] to see if we covered everything. Do we want to ask anything about grades vs MPE for teachers?"
>
> Knowledge Broker: "Do they have a preference?"
>
> Karen: "Yeah, and do we want to ask like the admin expectations? We didn't really cover that either. Like why do we write them or cause that's what this is all about [points to the admin section of diagram] and this is [points to philosophy section] what's the goal, what's the purpose, grades vs not grades vs MPEs. We didn't address either of those two things."
>
> Cassidy: "We're missing a couple of bones on the fish?"
>
> Karen: "We address the process."
>
> Cassidy: "We missed a couple ribs."

Despite observations of scholarly thinking, the knowledge broker had concerns that the participants had not felt completely comfortable interacting with research. The knowledge broker had separated the presentation into categories and emailed it to the participants to select which one they would like to present. The research category was the last one selected. In fact, by the meeting date, no one had selected it. As a result, one of the teachers who could not find any research, and thus had the least experience interacting with research, was tasked with organizing the research section. This was not recognized until the analysis, and was somewhat problematic when she worked on her section of the presentation. This was the exchange around the selecting the research section.

Knowledge Broker: "So research."

Cassidy: [points to Deanna]

Deanna: [Sad face]

Karen: "Hey you didn't reply girl." [All decided through email]

Deanna: "I know!"

Karen: "You've gotta just suck it up."

Deanna: "I know, I know it."

Knowledge Broker: "Well let's just talk about why no one chose it."

[No one answers the question directly but a conversation about their experiences with research in sews.]

Josh: "My research is …" [trails off/ whispers something]

Karen: "Garbage." [laughs]

Knowledge Broker: "What did you say Josh?"

Karen: “Garbage.”

Josh: “That it’s garbage.”

Knowledge Broker: “Your research is garbage? What do you mean?”

Josh: “It’s not as valid. Well, I’ve got the one thing from Fountas and Pinnel though and I think that’s pretty valid.”

Deanna: “Well I was going to say that’s pretty good.”

Josh: “…That one’s pretty valid but everything else was more informational and not as research based.”

This exchange was concerning to the knowledge broker. The group was about to present on their work and they were discussing their frustrations with the lack of depth of research based knowledge in the area of report cards. It was something the knowledge broker was aware of throughout the process; however, she did not realize it impacted some of them to this degree. This was also the moment that she realized some participants crossed the boundary farther than others and the extent to which they crossed was greatly impacted by their access to research. At this point, the knowledge broker did not feel as though there was much change in the teachers’ identities toward a hybrid professional (practitioner/scholar), and she considered ways in which she could improve this outcome. The knowledge broker did receive some feedback about an Inquiry Team member who referenced research in another setting. The knowledge broker’s reflections on this below:

> A day after the meeting [where no one volunteered for the research section] we split into our PLC groups and a colleague was in a PLC with one of the Inquiry Team members. She told me how the member in the group began the discussion around (grade level) report cards. The discussion was about if we should have academic skills on the report card or if it should be all social and emotional. My colleague relayed to me that the administrator was challenging some of the arguments that the Inquiry Team member presented. My colleague reported that the member stood

> her ground and used the research she read in the group to support her thinking. This makes me think that even though some members of the group may not be completely comfortable utilizing or citing research, that is not the case for every member.

This idea that members have different levels of identity development depending on their experiences at the boundary continued in the knowledge broker's reflections about the group's presentation.

> The part of the presentation that seems to lack the formatting and substance was the section where we presented about the research. This was also the section that was the last one to be selected by any of the team members. This makes me think that the teachers still are not really comfortable with discussing and utilizing research. When the teacher who was presenting the section about research presented the information she never mentions "The article said…" or "The books said…" or "The research said..". Instead the information was mainly presented in a way that was always relating back to her own experiences. I found this fascinating. However, there was another teacher who is more comfortable research as they are in the science field. He did mention research throughout the presentation.

Even though the research part of the presentation did not come together as the knowledge broker envisioned, there were other aspects of the presentation that pointed to some identity development.

> It was wonderful to see the teachers present their work and to hear them say things like "we analyzed the data for themes" or "our research shows this." It's amazing to see them talk about a major theme that they were able to identify in the literature, surveys, and when looking at other report cards. It was a lot of work for them.

It is clear that some changes to the identities of the participants occurred; however, it is unknown whether they would go as far as considering themselves as researchers/scholars. With more opportunities for teachers to participate in Inquiry Team activities, this hybrid identity may continue to develop. In addition, the knowledge broker will need to do more to individualize the amount of support participants need to cross the boundary.

Changes to beliefs. Even though the effects of the Inquiry Team on participants' identities are inconclusive, the researcher aimed to determine whether it impacted their beliefs in any way. When analyzing the data, many participants described how the Inquiry Team experience opened their eyes to new ideas. The QURBI results indicate that the Inquiry Team influenced the participants thinking in a number of ways. Table 18 below displays the results.

Table 18

The Impact of the Inquiry Team on Participants' Thoughts

Statement	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Changed my thinking about topic	3 (33%)	3 (50%)	1 (17%)	0	0
Helped me to understand the complexities of the issues	5 (83%)	1 (17%)	0	0	0
Reinforced my previous opinions about a topic	0	5 (83%)	1 (17%)	0	0

The results outlined above align with the post interviews of the participants where they mention how the Inquiry Team both changed and reinforced their thinking about a topic. Their responses are outlined below:

> Karen: "I would say both, I think I knew that there was something missing in terms of what we were looking at which was reporting student progress. And so it reinforced that there was, I always felt like as a parent myself and as a teacher that the context piece was always missing. Finding that in the research was validating. Then also seeing that the parents valued the perspective of the specialists… but they really did want to hear specifically from the specialists because that's a picture of the whole child. So I thought it was validating and also opened my eyes to things that I didn't necessarily think about before."

Dan: "A little bit of both I think. I think it just reinforced ideas in terms of what I thought was difficult and maybe what could work differently and more effectively. But it also opened my eyes to things that I hadn't thought of that we researched. Especially with putting it within the context of grade level appropriateness and how that looks to a parent. As I teacher, I instantly back off from it because I think about comparing the kids and that sense of ranking them, which I don't like. But as a parent I can see how helpful it would be to know how is my child doing comparatively speaking, not necessarily against his or her peers but as a third grader or a second grader. Is he doing what he is supposed to do? So I mean that was kind of eye opening for me, I hadn't really thought of it that way before and the research helped me to see it that way."

In these responses, the participants explained how the research changed their thinking and in Dan's experience on some level changed his beliefs on comparing students to a norm. Not all participants were as quick to change their thinking or beliefs, even when presented with research that was contradictory to their assertions. One participant, Cassidy, was particularly interested in examining grades as a possible formatting option. This is an excerpt from one of the Inquiry Team meetings.

Cassidy: "I don't know if this is the right venue for it or not but I have a little bit of interest in the impact of grades v.s. MPEs [meets expectations, progressing, experiencing difficulty]. Or grades vs. narrative…"

[Josh describes how a colleague in another school who teaches first grade gives grades and the complexities around that. The story describes how the grades can negatively impact student's perception of themselves as learners and of their teacher.]

Cassidy: "And then on the flip side, in fifth grade, you have people who are like oh,"

Josh: "What that are blowing it off?"

Cassidy: "Right, whatever, it doesn't matter…I handed back a paper to somebody today and it was 3 out of 5, they're like good enough, because you have to redo it if you get a 1 or a 2 out of 5, and their whole expression was good enough, good, don't have to redo it. Not I got it or I mastered it, or I'm using the strategy,

> good enough because for us MPE, good enough, it's not going to change the grade you know."

Before the research process, Cassidy explained her thinking around why grades are a salient option as she feels they will increase student motivation. Cassidy chose to be part of the group that investigates grades, a group of which Karen is also a member. Before the research began, Cassidy described how she planned to read anything, even if it was outside of her assigned topic of grades.

> Cassidy: "The only thing, we're not going to be in touch with one another, so I mean you're going to be looking, I mean and I'm going to be looking, I kind of feel like if it's on any of those three topics and I read it and it seems interesting, then I'm just gonna read it. Rather than being like oh that's not my topic, I'm not gonna read it. "

This quote is salient as Cassidy expressed later that she only read two articles, of the two she read she only turned in one to me. It is unclear what factor or factors influenced Cassidy not reading as many articles as she intended; however, it was apparent that her research was challenging her beliefs, and so were her colleagues. In the Inquiry Team meeting, she shared the two articles with the group and here is a segment of that discussion.

> Cassidy: [her research] "It didn't point well initially to a case for grades. And if you just google for grades almost everything comes up as negative, not positive, especially in the elementary grades. But it is interesting from what Alaina is saying from what parents want and even from what our surveys say, the parents like the checklists, they like want something in black and white, you know very concrete, and grades are very concrete…but apparently that wigs kids out.
>
> Josh: "I think it's something their familiar with and they grew up with."
>
> Karen: Exactly
>
> Josh: "We had them in school I mean, A and a B or a C."

Cassidy: “As a teacher too it is and I do toy with this idea and there is some case study, case.”

Karen: “Accountability.”

Cassidy: “Right, accountability. And kids who don’t do great sometimes, you have difficulty trying to motivate them sometimes and we’ve said it, I know we’ve said it at conference time we have said it, “Oh you know they might be one of the kids who does well once they get to the middle school and a grade is attached to their work”...and it’s true. You know they are capable of effort but without a grade they’ll slop anything down on the paper. If they are going to get a grade on it or their gonna lose five points for it then all the sudden it matters to them. That’s a little bit of a challenge there.”

Karen: “It’s also interesting when second and third graders, at least that’s what I know, when they start to do math tests, and they start to get scores. And you start seeing kids crying, worried, and nervous because they get a number on their paper and it kind of points to that where it causes anxiety or causes stress. If they knew there wasn’t going to be a number on that page would they still try as hard? Would it cause them more stress? Would they do better? All of those factors…”

Cassidy: “I would like to look, [facilitator], for more information. The fact that the two articles were one with just younger children and one was college aged children. But what I would like to see is like there any time when grades can spun as a positive?”

[This sparked a conversation about internal/external motivation – grades reinforcing external and learning becoming then all about the grades.]

Karen: What I actually read was when there are grades for students who, because you were just saying when are at the middle school, it will give them motivation. Actually, some articles are the opposite. That it actually causes them to try less because they don’t feel they are ever going to reach where they would like to be and so they just kind of are like, “well I’m just gonna get a C anyway so why would I try any harder.” You know it’s kind of the complete opposite effect.

Cassidy: On different kids, right?

Karen: Yeah, right it depends on the kid.

Cassidy: And so you almost feel like, you differentiate all of these other things, well like some kids maybe need a grade to motivate them and other kids you don't want to put a grade anywhere near them because you know they have that intrinsic motivation or external anxieties or internal anxieties for things like that. Of course, that doesn't make any sense either. You can't have a different system for every kid.

This conversation is interesting on a number of levels. Cassidy often found fault in the arguments that her colleagues presented that counter her own beliefs. In addition, she explained that she saw many articles that are negative as it relates to grades but that she wants to continue searching for that one article that finds they are positive. She never did do more research, and her log indicated that she initially spent 2 hours researching, which produced the two articles. Her log did not have any other time recorded that she conducted more research. To explore what happened a little further, Cassidy was asked to explain if the Inquiry Team process had any impact on her thinking in regards to grades.

Cassidy: "Yeah, I mean, I think the one thing that I did like in terms of our gathering the research was that looking at the different perspectives of the parents and the teachers. And that while a small percentage of the participants in the parent survey asked for grades or wanted more specifics, it wasn't necessarily grades they were looking for. Then the bit of research that was available, not specifically on report cards, but on grades in general did kind of show, for the majority of our elementary schools, again as a (grade) teacher there wasn't a strong correlation that grades would be harmful but for every other grade in our school aside from maybe fourth and fifth grade, the grade would've really not been a beneficial thing and not that I was really looking for grades in the younger grades but… the limited research we saw showed that it would be more detrimental than positive for elementary aged students and the fact that the parents didn't really want it, it was like okay well I guess we won't do it. But it still didn't answer the question I think I had…how can we measure these kids against benchmark but we came up with some ways to maybe, possibly do that."

Knowledge Broker: “Outside of grades?”

Cassidy: “Yeah, outside of grades.”

In this dialogue, Cassidy did not completely succumb to the idea that grades should not be used when evaluating students in the fourth and fifth grades. When she was faced with the data from the parent and teacher surveys and the initial research findings, however, she was open to another possible solution to the problem. It is unclear whether her beliefs about grades are changed; however, the experience did broaden her thinking about grades. Additionally, she could have chosen to deepen her research knowledge about grades but she did not for reasons that are unknown to the researcher. It is also salient to note that of all of the research topics (i.e., narrative, alternative report cards, grades), the most information could be gathered about grades. In fact, Alaina shared a meta-analysis entitled: “A Century of Grading research: Meaning and Value in the Most Common Educational Measure” (Brookhart, Gusky, Bowers, McMillian, & Smith, 2016), Alaina was the only person who read that article.

RQ5: What Aspects of the Inquiry Team Experience Supported or Inhibited Knowledge Mobilization?

Much of the data presented in the previous pages provides evidence that knowledge was mobilized among the participants in the Inquiry Team due to boundary crossing that occurred within the organization. In order to determine whether knowledge was mobilized to those not participating in the Inquiry Team, the QURBI was given to four faculty members who did not participate in the meetings. The results of the survey are displayed in Table 19 below.

Table 19

Non-Inquiry Team Members’ Perspective About the Inquiry Team

Statement	Never	Sometimes	Often	Always
Discussed the IT member's engagement in the process	3 (75%)	1 (25%)	0	0
Discussed with the IT member how to get research	3 (75%)	1 (25%)	0	0
Inquired about the information the IT member learned	3 (75%)	1 (25%)	0	0
Asked specific questions about the topic	3 (75%)	1 (25%)	0	0
Applied any knowledge from the IT in your practice	3 (75%)	1 (25%)	0	0
Used any info from the IT to resolve problems in your daily practice	2 (50%)	2 (50%)	0	0
Used any info from the IT to develop new materials	3 (75%)	1 (25%)	0	0
Shared what you had learned from IT with another faculty member	3 (75%)	1 (25%)	0	0
Shared what you had learned from IT with persons outside of the school	3 (75%)	1 (25%)	0	0
Have an interest in participating in future IT opportunities	1 (25%)	1 (25%)	1 (25%)	1 (25%)

This very small sample of the faculty surveyed after the presentation, suggests that knowledge was not largely mobilized from the participants to the non-participants during the process. This may be related to a number of factors, including timing, as the presentation of information to the faculty did not occur

until the end of the year, which would impact mobilization and application of the knowledge. Additionally, outside of the presentation there were no formal efforts to mobilize information to the faculty. There were also no efforts to connect with other schools or anyone from the research community, largely due to a lack of time. As a focus group, the participants mentioned that it would've been a good idea to collaborate with other independent schools to see what they were doing. In future Inquiry Team experiences, it may be salient to have the knowledge broker collaborate with the participants around what connections outside the group might need to be made.

Accessing research. When analyzing the data, some factors emerged as having an inhibitory effect on knowledge mobilization during the Inquiry Team experience. Much data were collected on the difficulty the participants had in accessing and finding research. This was noted in the focus group data and observed in the Inquiry Team meetings. The participants often voiced their frustrations with trying to find and access research. Here are a few examples from the video transcripts:

> Alaina:"…The only thing I was telling [the knowledge broker] was that I started to look at research for something unrelated and it's really hard to track down research without paying big bucks to find out what the research is…I belong to this science organization that's all about research, science education it's a book of all of these research projects that have been collected. You get a synopsis and then if you want more than that you have to go to whatever institution they belong to separately and then pay for that again…Its expensive to get access to the research that has already been done."

This was at a meeting early on before the research for the Inquiry Team began. Sometime after this meeting, the knowledge broker provided the team members with website links

to free access journals. For many participants, accessing research and finding information about report cards continued to be problematic.

> Josh: "I thought our topic was a little harder than I was expecting. I'm not sure if you also.."
>
> Alaina: "uh huh." [agreement]
>
> Knowledge Broker: "Oh good, you guys have the same one." [Alternative report cards topic]
>
> Josh: "I kind of expected to find a lot more…I thought it was pretty hard…So then I sort of transformed it into sort of just grades vs not grades, potentially. That's what I ended up finding more information on, I gathered a lot more on not grades."

To remedy not finding information on a specific topic, like Josh, many participants would just search for a different topic; however, sometimes that was not much more fruitful, and the frustration mounted.

> Karen: "So it's *Educational Leadership*, so it's just an article from it because I had looked for research but I was getting frustrated because I couldn't access any of it. I just sent you [knowledge broker] two articles that I needed access to."

The participants did not utilize the knowledge broker's access to research through the university she was attending until everyone began to discuss their frustrations with access. Then they began emailing her all of the articles or books they needed access to. It was difficult for the knowledge broker to keep track of everything and in retrospect needed a more advanced organizational system beyond email. Finding information on narrative report cards was the most difficult, even for the knowledge broker. Much of the information was inaccessible and older research. Deanna had the topic of narrative report cards and she discussed her experiences at one of the meetings.

Deanna: [makes sad face about not finding narrative research]

Deanna: "Well I never even had an article because I could only find a book, that I don't think we ever got."

Knowledge Broker: "So I emailed the library and said hey I never got this. Then they said the only place we could find it was from Australia. So then this other librarian wrote back to me and we can find it in California. It's on microfilm. So I might just email them back and say don't bother."

Deanna: "I thought we found a newer book?"

Facilitator: "Email me, maybe I did order the other book?"

The knowledge broker did not order the other book, as Deanna's email was lost in the shuffle. When the knowledge broker did try to get the book, the library could not find it on the shelf and had no idea where it was. Additionally, no other library in the town had it. When doing some research, however, the knowledge broker was able to pass along an article and get another book that had one chapter devoted to narrative report cards. By the time the participant received the book it was nearing the end of the process and her engagement level with researching had diminished. As such, the field of study on narrative report cards was so thin that it could really not inform the Inquiry Team members' thinking. As a result, the members had to rely on their own experiences and the survey feedback to guide their work.

Time. Time was another salient factor in the ability for the Inquiry Team experience to mobilize knowledge. It was difficult accomplishing all of the tasks the Inquiry Team intended in the five months they had and in the hour or so they had at each meeting. Dan describes how more time would have been useful.

Dan: "It's always just in the interest of time. It would've been nice to be able to do some of the research, actual like searching the databases

> together…For example, when I was having trouble finding things on narratives, I could sit with someone and say is it something that I'm doing wrong technically or are you not finding something either? But then again that would be another meeting after school and time that we don't have."

Sometimes it was difficult to accomplish everything needed in between meetings as well. The knowledge broker discussed this concept in her journal.

> …Prior to our last meeting we have just received the results of the parent survey and I decided just to code it instead of involving the Inquiry Team for the sake of time. Coding was more difficult and stressful for some of them than I anticipated. I would say probably it was more of a lack of time then I real misunderstanding but they didn't have it completed. It was only two of the six people it didn't have the coding finished.

It was difficult for the knowledge broker to know what to prioritize at times as anything left to the end of the agenda might not get accomplished. Whatever did not get accomplished at the meetings led to more work for the participants. The QURBI results also revealed some data in relation to time; these results are illustrated in Table 20.

Table 20

Time as a Factor Impacting the Inquiry Team Experience

Statement	Very Easy	Somewhat Easy	Undecided	Somewhat Difficult	Very Difficult
Finding the time to meet	2 (33%)	4 (67%)	0	0	0
Having enough time at each meeting to accomplish tasks	0	3 (50%)	1 (17%)	2 (33%)	0
Completing activities in between meetings	1 (17%)	2 (33%)	1 (17%)	3 (50%)	0

Some of the difficulties that occurred in completing tasks during and between meetings are communicated in the survey results. In future Inquiry Team experiences, the knowledge broker will have to consider time on many levels. As

lack of time can inhibit what is accomplished and communicated, as well as the connections with other stakeholders.

Online communication. The online space that is used for communication can also support or inhibit knowledge mobilization. The focus group data and post intervention interviews revealed that participants felt as though the online communication as helpful, this was manly accomplished though the school's email account. What they felt could have been improved was the online space that the team used to share information. The online space was provided through their email account and enabled documents, website links, and notes to be shared on the space. The participants felt as though it was not user friendly, and cited that Google documents is a tool that is more user friendly and thus promoted knowledge mobilization.

Comfort with using research. Many factors described in the previous pages outline how knowledge mobilization was enhanced by the Inquiry Team process. A focus on collaboration, the gathering of information from many sources, and the role of the knowledge broker all supported knowledge mobilization. One area that emerged from the data was how comfortable many of the participants felt using research—a critical aspect of mobilization. Questions on the QURBI asked respondents about their level of comfort with the following after the Inquiry Team experience in Table 21.

Table 21

The Level of Comfort Associated with some Inquiry Team Activities

Statement	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Helped me to feel more comfortable utilizing research	2 (33%)	4 (67%)	0	0	0
Encouraged me to conduct research	1 (17%)	3 (50%)	1 (17%)	1 (17%)	0
Helped me to feel more comfortable reading research	0	6 (100%)	0	0	0

The data indicate that many of the participants reported feeling more comfort with utilizing and reading research as a result of being part of the Inquiry Team.

Leadership. A contextual factor that helped to promote and diminish knowledge mobilization was the head of school. The decision not to include the head of school in the Inquiry Team was a decision made by the knowledge broker. The knowledge broker feared that her involvement would introduce a hierarchy into the group and would thus minimize the amount of collaboration. The focus group feedback mentioned how it is important to "make sure the head of school is on board with the work or the process" of the Inquiry Team. To gather more information Karen was asked if she thought an administrator could facilitate the Inquiry Team.

> Karen: "Yes, as long as the administrator has created that environment for teachers already, that their opinion matters, that they feel validated, that they feel they have something to bring to the table. That the administrator acts as you did as more of a facilitator and not a mandator. I think that it is definitely possible, I think that in our environment it would've not been possible. I think that's what we appreciated was that we were able to do it amongst ourselves, we were comfortable amongst ourselves and you were kind of our messenger."

In this context, not involving the head of school added to the success of the Inquiry Team's collaboration. At the same time, not involving her and having her support waiver at times created uncertainty amongst the group that anything

would change. It also caused the group only to communicate with the head of school what they had to, as they feared she would not agree with their work. The relationship with the participants and the leadership style of the administration is a salient factor that can contribute to the success of the Inquiry Team endeavor and may influence their participation in the group.

Discussion

The boundary perspective is used to describe the space that exists between educational research and practice. In the literature, the boundary is often illustrated as a barren space devoid of action and interaction (Akkerman & Bakker, 2011). Scholars have begun to discuss the potential that this has as a space that cultivates and sustains interactions between stakeholders by providing opportunities for boundary crossing and the Inquiry Team intervention aimed to emulate this characterization. Each Inquiry Team meeting provided a time for participants to inhabit boundaries. The members not only inhabited organizational boundaries that exist as teachers from different grades/specialty areas do not often have time to collaborate. They also spent some time in the boundary between educational research and practice. Although the intervention was created to address boundary crossing on multiple levels (Akkerman & Bruining, 2016) the intervention could not overcome difficulties with research accessibility and the poor depth of education literature relating to report cards. This finding may challenge intervention models and thinking that places the onus for the lack of educational research application primarily on teachers.

When further conceptualizing the boundary that exists between education research and practice, the idea that widths of the boundary may be influenced by the different research disciplines was introduced in Chapter 1. As an example, scholars have

argued that the boundary between neuroscience and education is too wide to be traversed (Breur, 1997). In this study, neuroscience research was not used by the Inquiry Team participants which may reinforce ideas relating to variances in boundary width. What was more prevalent in the data collected was the individual variances in boundary crossing. This may be the product of a number of factors, such as participants' prior research knowledge or use, ease of gathering research, and personal beliefs/identities. For example, the science teacher has historically utilized research to inform his practice and as a result was more comfortable with navigating the boundary. Other participants did not benefit from such a history and had difficulty finding information on their specific report card topic (i.e., narrative report cards/ alternative report cards). As a result, it was more difficult for them to navigate the boundary; thus, they would have benefitted from more individualized assistance from the knowledge broker.

The individualized nature of boundary crossing is salient and should be taken into account by intervention developers and policy makers. Although practitioners can be identified as a stakeholder group, scholars should not anticipate that all practitioners will respond to boundary crossing efforts similarly. Even though the Inquiry Team intervention was delivered to the group as a whole, the participants may have experienced difficulties with various aspects of the process, which contributed the extent to which they sustained interactions at the boundary space between research and practice. Future iterations of the Inquiry Team model should devote time to meet individual needs of the participants. For example, meetings could have time at the end for the knowledge broker to work with participants one on one as they engage with research. Additional time could also be devoted outside of the meetings as well. Possible supports should be grounded in

the needs of the participants and the organizational factors within the context. This positions the knowledge broker to be able to minimize frustrations to ensure a smooth boundary crossing experience for all of the participants. Figure 14 illustrates how the need for individual support as participants interact with research literature.

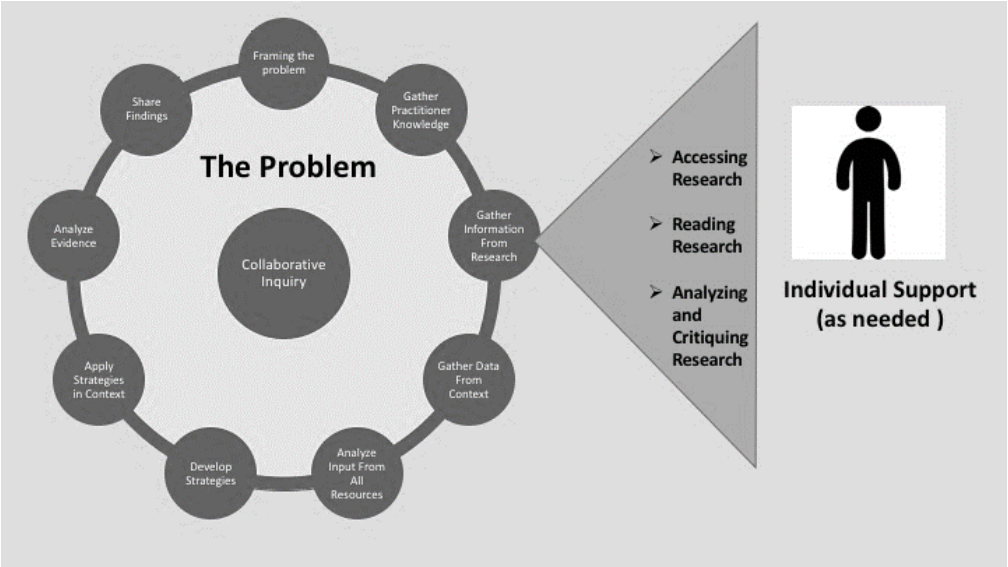


Figure 14. The Inquiry Team intervention reimagined.

An important distinction to the original conception is the prevalence of the problem. Through the Inquiry Team experience, this problem was disused continually. It was not just framed and then forgotten; it was connected to every aspect of the process and it is the foundation of the process depicted in yellow in the diagram above. The time devoted to conceptualizing the problem and creating the fishbone diagram was salient. The fishbone diagram served as a useful resource that was referenced by team throughout the process. It is also important to note that the three circles devoted to gathering research did not occur in a sequential order. The process of gathering information from various sources often overlapped. For example, in one meeting, participants could share some

research and work on constructing a survey. The research gathering process was orderly but not necessarily cyclical as depicted in the image.

While the intervention encouraged some boundary crossing between educational research and practice, for fruitful boundary crossing to occur changes to practices in the research community are needed. Practices that encourage the status quo in regards to research accessibility, depth of applicable research in the field, and the minimal utilization of practitioner knowledge must be addressed. Only when efforts to encourage boundary crossing occur on both the research and practice sides, can the boundary space become a place of learning, interaction, and innovation that scholars have described. While educational practitioners may not be able to influence boundary crossing efforts on the research side of the boundary, they should continue to employ mechanisms for boundary crossing within their own organizations. Crossing boundaries internally may create internal structures that enable knowledge mobilization of the information created and shared at the boundary. The Inquiry Team intervention data suggests some positive outcomes can result when multilevel boundary crossing within a school context occurs and practitioners are given the tools to make informed decisions.

Connections to the Literature

Although there is not a study that has the exact inquiry cycle and components of the Inquiry Team intervention described in this intervention, there are aspects that have been studied previously so that connections can be made. One such component is collaborative inquiry. In their study of 29 participants who engaged in collaborative inquiry, Huffman and Kalnin (2003) found that participants reported an increase in collaboration with colleagues and an improved ability to conduct research. In the Cantalini-Williams et al. (2015) study of collaborative inquiry, the researchers found that

teachers developed an increased awareness of research and valued collaboration. Similar findings were described in the Inquiry Team experience as teachers reported an improved ability to collaborate and read and access research.

Huffman and Kalnin (2003) also found that participants in collaborative inquiry reported strengthened feelings of professionalism, just as participants in the Inquiry Team expressed feelings of empowerment. Much like the Inquiry Team members, participants in the Huffman and Kalnin study expressed their concern over having the authority to ensure their work continued in their context. Some of the Inquiry Team members expressed that same concern at Sunnyville and along with doubt that the report card would actually change. Levin (2004) noted the influence of existing habits, practices, and cultures on stalling change efforts. This was the exact experience the Inquiry Team had as illustrated in many of the interactions with the head of school. Avalos (2011) reported that school cultures can either inhibit or support collaborative inquiry, which was on display as well at Sunnyville. Although the Inquiry Team format aimed to change organizational structures to support collaboration, innovation, and bottom-up decision-making, this created conflict at times as the cultural norms were challenged.

The activities that the participants engaged in as they completed the inquiry cycle also influence outcomes. Nelson et al. (2008) studied the experiences of 12 collaborative inquiry facilitators and found that the group created collaborative norms that helped them to develop a culture of inquiry and aided in the development of a high level of trust amongst participants. The Inquiry Team also developed norms, but it was unclear whether the trusting environment reported by the participants was related to the norms or was derived due to other factors. Inquiry Team members had difficulty finding time to

read and look for research this is a well document finding in the literature for teachers in other contexts (Butler & Schnellert, 2012; Cantalini-Williams et al., 2015; Huffman & Kalnin, 2003). It was not only reading the research, but also knowing the type of research article they viewed proved challenging. In the Inquiry Team intervention, more time was needed to aid participants in interacting with research. Bartels (2003) found that teachers based their legitimization of articles on their ability to integrate the new knowledge into their current knowledge base; they cared less about if empirical evidence was provided. Data also revealed similar findings in the Inquiry Team intervention as excitement about an article's application seemed to overshadow the lack of research base of its claims. Sinnema et al. (2011) reported changes to the identities of the participants who engaged in collaborative inquiry. Although initial data may suggest that Inquiry Team participants' identities had changed to include attributes of practitioner researchers, the results were not definitive.

The literature can provide little empirical insight into how a knowledge broker is utilized in educational settings; however, there are many descriptions of how the role could be applied. Bultitude et al. (2012) asserted that as third parties, knowledge brokers have the ability to maintain an impartial perspective while providing insight into how to best foster collaboration between educators and researchers. Knowledge brokers are often expected to bridge the divide between various stakeholders (Akkerman & Bruining, 2016; Hagadon, 2002; Mayer et al., 2013). At Sunnyville, the data showed that the participants largely felt as through the knowledge broker served as a bridge to the head of school. Mayer et al. (2013) conducted a study on coaches, finding that they aided in having a CoP reach their goals, allowed for dialogue, and acted as mediators and

supporters. The knowledge broker in the Inquiry Team intervention had to manage similar responsibilities as was previously described, which was difficult at times. Knowing exactly what activities to engage the participants in became one of the most challenging aspects of the role. The literature also describes the importance of establishing trust and perspective taking (Kalkan, 2016; Mayer et al., 2013; Reid, 2014), which was demonstrated by the knowledge broker at Sunnyville. There are many characteristics and skills the knowledge broker must possess to be a successful facilitator, which in turn directly impacts the success of the Inquiry Team process.

Recommendations and the Relationship to Practice

Empirical research on the relationships between educational research and practice must continue to provide a clearer understanding of the problems and possible solutions. Much is written about the gap between educational research and practice but few empirical studies examine the varied solutions often suggested by scholars. While some organizations are trying to provide solutions, there must be a more concerted effort to move beyond the continued identification of the problem and attempts to enact some solutions within current faulty educational structures. What makes the results of the Inquiry Team intervention so promising is that it may be a mechanism for increasing teacher engagement in educational problem solving and innovation. It provides a possible path for an equalization and utilization of practitioner knowledge and research knowledge. Perhaps most importantly, it is a possible vessel for the field to challenge the hierarchal leadership structures that have dominated the organizational structures of schools that have and continue to diminish knowledge mobilization. These initial positive outcomes of the intervention are hampered by the organizational structures of the research community that still inhibit practitioners' full engagement with research.

Future researchers must continue to study the effects of increase teacher involvement and the organizational change of schools. Additionally, teacher preparatory programs need to improve their efforts to cultivate the skills future practitioners need to be able to access, read, analyze, and utilize research. Once those skills are developed, schools should provide opportunities for teachers to apply that knowledge in educational settings. Additionally, mechanisms should be established that will enable educators to access research long after they have graduated from postsecondary education institutions. Inquiry Teams should be researched further as a possible mechanism for teachers to be able to gain and utilize research skills. As such, knowledge brokers could educate teachers who do not currently possess those skills and help foster collaboration amongst those who already do. More research needs to be conducted to fully understand the knowledge broker role and the extent to which context influences its development.

When attempting to implement the Inquiry Teams Intervention model in another educational context, it is important to consider the following recommendations. It may be salient to use a pre-assessment of the participants' skills interacting with research to ensure the knowledge broker has an understanding of the level of support each individual member might need. It is also important to engage the administration early and often to ensure their support is unwavering. Involving the administration is ideal if the collaborative environment of the Inquiry Team can be sustained. To maximize the Team members ability to find the time to participate, it is wise to integrate the Inquiry Team meetings with the professional development structure or ideally as a scheduled part of the teacher's planning time. Providing teachers with the time to collaborate, engage with research, and to innovate is central to the goal of maximizing the use of practitioner

knowledge. Lastly, to support the knowledge broker as she navigates complex and dynamic situations, it may be helpful to interact with other knowledge brokers. No two knowledge brokers' experiences would be exactly the same but each might benefit from the opportunity to share their experiences with others in a similar role. If none are available, meeting to debrief and brainstorm with supportive members of the administration is a viable alternative.

The recommendations above reflect some of the findings and experiences from this project. However, additional research is needed before the Inquiry Team model can be implemented on a broader scale. For example, it may be salient to compare the outcomes of Inquiry Team experiences to other forms of professional development. Additionally, further examination of how organizational changes at the university level to make disseminated research more accessible and more readily integrated with practice based knowledge also needs to be conducted. Together, such work can help to tap into and mobilize the many forms of knowledge that exist in the field of education.

Limitations

There are some limitations to examine when considering the application of the knowledge described in the findings. The sample size of the practitioners studied was quite small and situated within one context. This affects the generalizability of the findings. In addition, it is unknown what effects the researcher taking the knowledge broker role in the study had on the outcomes. While many efforts were taken to ensure that the participants could provide authentic feedback, it could have impacted their responses.

Summary

A majority of the participants found the Inquiry Team experience in general and each of the components of the process to be valuable. This outcome occurred even with the difficulty many of the participants faced finding research related to report cards and the feeling that they lacked consistent administrative support. Despite the imperfect experience that the participants had, they all expressed interest in participating in an Inquiry Team again, and the post intervention interviews revealed that it could be a professional development format that could be applied in other contexts to solve problems.

A salient feature of the Inquiry Team format is the time spent collecting data from the context, practitioners, and the research community. The final innovative product could not have been conceptualized without knowledge gathered from all three areas. The knowledge gained from the practitioners who participated helped to frame the problem and provided guidance for where to gather more information from the context. The practitioners knew who to talk to and where to find information at Sunnyville or other schools. In addition, the practitioner knowledge of the problem was pivotal in the crafting of the parent and teacher surveys. Even though educational research was limited, it had a role in moving away from grades as a possible solution and helping teachers to consider the importance of providing parents context so they had a sense of how their child was performing in relation to grade level benchmarks. All of the knowledge utilized in the process was of value and often intertwined to inform next steps, new conceptualizations to the problem, and possible solutions.

Along with intentionally referencing multiple sources, participant collaboration enabled the analysis, synthesis, and application of the information gathered. As such,

knowledge was able to be shared amongst the participants and the knowledge broker. Knowledge was not mobilized much beyond the Inquiry Team members, however, until the presentation of their work and findings to the faculty. While the actions and the demeanor of the knowledge broker was able to foster collaboration amongst the participants, the minimal research literature on the report cards was a challenge that was even difficult for the knowledge broker to overcome. The frustration that the members felt in trying to access and find information about report cards limited the extent to which the participants were able to cross the boundary.

The Inquiry Team's activities did not occur in a vacuum and it is unsurprising that their priorities and perspectives did not perfectly align with others within the school. For example, from the outset Team members' attitudes and expectations about the narrative report card were different from those of the administration. The conflicting agendas made for some tense moments that the knowledge broker was tasked with navigating. The experience underscored the importance of administrative support even if that does not include their membership on the Inquiry Team. However, it is also of import to note that the moments of conflict also unearthed the feelings of empowerment the Inquiry Team members felt as they worked together. It was in those moments when cultural norms and hierarchal structures were being challenged that many teachers reported finding their voice. Many of the participants noted that the report card discussion would have probably halted if not continued by the Inquiry Team process. The process challenged the status quo of educational decision-making at Sunnyville which was often based on the head of school's experience and knowledge passed along from her network of practitioner peers.

Although some practitioners found it easier to engage in work at the boundary between research and practice than others, the study showed that multilevel boundary crossing did occur. Boundary crossing at the institutional level included changes in collaboration and hierarchal structures at the school. In addition, the role of the knowledge broker with access to a university helped the participants to access research. At the interpersonal level, the knowledge broker, in collaboration with the Inquiry Team members, created an environment that was fun, calm, and evoked a sense of trust. This deepened the level of collaboration in a way structural changes cannot accomplish on their own. The knowledge broker also worked to ensure the needs of many stakeholders were considered during the process. The participants were also encouraged by the knowledge broker to share their knowledge with their colleagues and the head of school. Lastly, at the intrapersonal level, identities and belief systems are beginning to change. Although the process supported teachers taking on the role of a researcher, it is unclear if they view themselves as such. Although the data is unable to support that Inquiry Team member's belief systems had changed, participants did express that the experience expanded their thinking.

After analyzing the data, it was clear that all aspects of the Inquiry Team process are of value and were pivotal in influencing the group's decision-making. The experience had some unintended effects such as increased feelings of empowerment and opportunities for innovative thinking by the participants. The process is greatly impacted by the ability of the knowledge broker and the school context. All of these factors must be considered in the implementation of the Inquiry Team model in other contexts. Although there is much to empirically investigate regarding the boundary between

education and practice, Inquiry Teams, and the knowledge broker role in education, the field has much to gain if the boundary can be transformed into a space of knowledge mobilization and innovation.

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Appendix A: Survey

Instructions: Please complete the following background information. Your information will be kept strictly confidential.

Name: _____ Date: _____

Years Teaching: _____

Current Grade Level/Subject Teaching:

_____

Highest Education Level (bachelors, masters,etc.):_____

Instructions: Please answer all of the following questions to the best of your ability. The responses will be kept strictly confidential. When you have completed the survey and signed the consent form, please enclose both documents in the sealed envelope. Please return the envelope to my office or my box in the teachers' lounge.

1. Information used to inform my instructional practice comes from the following: (Place an X by all that apply).

_____ Curriculum implemented by the school

_____ National Standards

_____ Administration

_____ Colleagues

_____Postsecondary Education (undergraduate/graduate programs)

_____ Professional development outside of the school (eg. Conferences)

_____ Professional development provided by the school (eg. Inservice Days)

_____ Academic Journals

_____ Education Magazines

_____ Education Websites

_____ Education Blogs

_____ Books

_____ Other: _____

2. Of the options selected above, which ones are most often utilized to inform your instructional practice. Explain.

_____

_____

_____

_____

_____

_____

_____

_____

3. To what extent does your understanding of the workings of the brain influence the following… (Select one response option per category)

Categories	much influence	some influence	little influence	no influence
instructional practice				
curriculum content				
structure of the school				
teacher – student interactions				
behavior management				

4. Please describe the information about the workings of the brain that you utilize in your classroom setting.

_____

_____

_____

_____

_____

_____

5. Which of the following sources have provided you with information about the role of the brain in education: (Place an X by all that apply)

_____ Curriculum used by the school

_____ Administration

_____ Colleagues

_____ Postsecondary education (undergraduate/graduate programs)

_____ Professional development outside of the school (eg. Conferences)

_____ Professional development provided by the school (eg. Inservice Days)

_____ Academic Journals

_____ Scientific Journals

_____ Education Magazines

_____ Education Websites

_____ Education Blogs

_____ Books

_____ The Media

_____ Other: _____

_____ No sources have provided information

6. To what extent should neuroscience be used to inform educational practice? Neuroscience is defined as "all of the sciences that deal with the structure or function of the nervous system and the brain" (Nordqvist, 2014). (Select one)

_____always used _____sometimes used _____neutral _____not used

Please explain:

_____

_____

_____

_____

_____

7. To what extent are you interested in using information from neuroscience to inform your instructional practice? (Select one)

_____very interested _____ somewhat interested _____neutral _____not interested

Please explain:

_____

_____

_____

_____

_____

8. To what extent are you familiar with the term neuroeducation? (Select one)

_____quite familiar _____ somewhat familiar _____have heard of it _____not familiar

If recognized to any degree please explain:

_____

_____

_____

_____

_____

References

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Appendix B: Questionnaire About the Use of Research-Based Information in Professional Practice

QUESTIONNAIRE about the use of research-based information in professional practice

This questionnaire is part of a study being conducted by Johns Hopkins University. The purpose of this questionnaire is to find out about the use of research-based information.

Research-based information comes from sources such as:

- scientific publications;
- government reports;
- reviews of research;
- data generated within your institution and
- evaluations of your organization.

Research-based information differs from **practice-based information. Practice-based information** is acquired through personal experience. This information includes one's intuition and personal perceptions based on one's own observations as well as the feedback and comments of others.

All information you provide will be kept strictly confidential and under no circumstances will your individual responses be released to your administration.

Your participation is entirely voluntary and you are free to discontinue at any time. However, your professional experiences and opinions are crucial to helping us understand how research-based information is used in practice. We would greatly appreciate your taking time to complete this questionnaire.

If at any time you have questions about your rights as a research participant, please contact the student investigator Jennifer Asmonga: jasmonga@shadysideacademy.org or (412) 719-4728.

How to answer the questionnaire

Please answer each question by filling in the circle that represents your choice. You can choose on answer only for each question.

Fill in the circle completely WITHOUT going beyond the perimeter: ●

Do not do the following: ⊗ ⃠ ⊙ ○ ○ 

Note: **Do not use a fluorescent or felt pen.**
Use a lead pencil or a ballpoint with black or dark blue ink.

SECTION 1- General information

1. Are you male or female?

Male	Female
○	○

2. How old are you?

20 to 29 years old	30 to 39 years old	40 to 49 years old	50 years old or over
○	○	○	○

3. The highest degree obtained

Preuniversity	○
Undergraduate certificate	○
Undergraduate degree	○
Master's degree	○
PH.D.	○
Other (Please specify):	○

4. Have you taken prior coursework in research methods?

No prior coursework	○
Research Methods coursework taken	○
Research Methods coursework in progress	○

5. Have you participated in research projects?

No prior participation in research projects	○
Worked with University researchers	○
Worked with teachers in school projects	○

6. What is your category of employment?

Homeroom Teacher	○
Specialist Teacher	○
Head of School	○
Teacher's Assistant	○
Other (Please specify) :	○

7. How long have you been working in the educational field?

0 to 3 years	**4 to 7 years**	**8 to 11 years**	**12 to 15 years**	**16 to 19 years**	**20 to 23 years**	**24 to 27 years**	**Over 27 years**
○	○	○	○	○	○	○	○

SECTION 2 – Using information in your everyday practice at work

In this section we want to document the type of information you use in your everyday practice at work.

		Using the following scale, rate the frequency with which you have used research-based information from the following sources during the past year…	**Never**	**1 or 2 times**	**3 or 4 times**	**4 times or more**
			1	2	3	4
8.	15	Scholarly documents (journals, publications etc.)	○	○	○	○
9.	16	Publications by professional educational organizations	○	○	○	○
10.	17	Evaluations of your organization	○	○	○	○
11.	18	Internet Web sites	○	○	○	○
12.	19	Multimedia materials, such as video, DVD and software	○	○	○	○
13.	20	Mass media, such as television, radio, newspapers and magazines	○	○	○	○
14.	21	Preservice training or university courses	○	○	○	○
15.	22	In-service training or workshops	○	○	○	○
16.	23	Professional conferences or presentations	○	○	○	○
17.	24	Experts or resource people	○	○	○	○

- **Please list other sources of information you use in your everyday practice at work:**

_____

_____

_____

_____

SECTION 3 – The type of use of research-based information

In this section, we want to document how you use research-based information in your practice at work.

Using the following scale, rate the frequency with which you use research-based information to ...		**Never**	**Sometimes**	**Often**	**Always**
		1	2	3	4
18.	25 Achieve a better understanding of issues in your practice	○	○	○	○
19.	26 Satisfy intellectual curiosity	○	○	○	○
20.	27 Improve your professional practice	○	○	○	○
21.	28 Reflect on your attitudes and practices	○	○	○	○
22.	29 Justify or validate your actions and your decisions	○	○	○	○
23.	30 Resolve problems in your daily practice	○	○	○	○
24.	31 Develop new activities, programs, guidelines, and materials	○	○	○	○

- **Please list any other type of use of research-based information:**

_____

_____

_____

_____

SECTION 4 – Your opinion about research-based information

In this section we want to document your opinion about research-based information.

Using the following scale, rate the extent to which you personally agree that research-based information…		**Strongly disagree**			**Neutral**	**Strongly agree**
		1	2	3	4	5
25. 32	Is easy to find	○	○	○	○	○
26. 33	Is easy to understand	○	○	○	○	○
27. 34	Is relevant to your reality	○	○	○	○	○
28. 35	Offers timely information	○	○	○	○	○
29. 36	Is reliable and trustworthy	○	○	○	○	○
30. 37	Is useful to guide or improve your professional practice	○	○	○	○	○
31. 38	Is easy to transfer into your practice	○	○	○	○	○

- **Please add any other opinions about research-based information:**

_____

_____

_____

_____

SECTION 5 – Awareness activities

By "awareness activities" we mean methods and strategies that make practitioners aware of research findings.

Using the following scale, rate the extent to which you agree that the following activities are useful to make you aware of research-based information…		**Strongly disagree**		**Neutral**		**Strongly agree**
		1	2	3	4	5
32.	Presentation of research findings tailored to your needs	○	○	○	○	○
33.	Your involvement in a research project	○	○	○	○	○
34.	Research results accompanied by clear and explicit recommendations	○	○	○	○	○
35.	Opportunities to discuss research results with the research team	○	○	○	○	○
36.	Regular contacts with people who distribute research-based information	○	○	○	○	○
37.	Demonstrations about how to apply research recommendations	○	○	○	○	○
38.	Discussions of research-based information with colleagues	○	○	○	○	○

- **Please list any other awareness activities that may be useful in your practice at work:**

_____

_____

_____

_____

SECTION 6 – Individual expertise about the use of research-based information

By "individual expertise" we mean your skills, competence and ability to use research-based information in practice.

Using the following scale, rate the extent to which you agree that the skills listed below are useful in your practice	**Strongly disagree**		**Neutral**		**Strongly agree**
	1	2	3	4	5
39. Ability to read and understand the research publications	○	○	○	○	○
40. Skills to use information technology such as Internet, databases	○	○	○	○	○
41. Ability to assess the quality of research-based information	○	○	○	○	○
42. Expertise to translate research findings to practic	○	○	○	○	○

➢ **Please add any other skills that may be useful in your practice at work:**

_____

_____

_____

_____

SECTION 7 – Organizational Factors

By "organizational factors" we mean elements that have to be contended with in everyday life and that may affect professional activities including organizational culture such as established habits, traditions and values and physical and human resources.

Using the following scale, rate the extent t which you agree that your use of research based information is influenced by the following organizational factors...	**Strongly disagree**		**Neutral**		**Strongly agree**
	1	2	3	4	5
43. Available time to read a journal, to apply a new technique, etc.	○	○	○	○	○
44. Available facilities and technology	○	○	○	○	○
45. Incentives, such as financial payment, lessening of the work-load, etc.	○	○	○	○	○
46. Opportunities to challenge established habits and traditions	○	○	○	○	○
47. Organizational importance for professional Development	○	○	○	○	○
48. A supportive environment	○	○	○	○	○
49. Human resources**,** such as the availability of qualified staff	○	○	○	○	○
50. Organized groups, such as unions, granting agencies and media	○	○	○	○	○

- **Please list any other organizational factors that may influence your use of research-based information:**

_____

_____

_____

_____

SECTION 8 –Inquiry Team Experience

In this section, questions will ask about your Inquiry Team experience more generally.

Using the following scale, rate th extent to which you agree or disagree that the Inquiry Team experience...	**Strongly disagree**	**Disagree**	**Undecided**	**Agree**	**Strongly Agree**
	1	2	3	4	5
51. Influenced the way I will make educational dec the future	○	○	○	○	○
52. Encouraged collaboration with my colleagues	○	○	○	○	○
53. Helped me to feel more comfortable utilizing re	○	○	○	○	○
54. Encouraged my interest in participating in futu team opportunities	○	○	○	○	○

SECTION 9 –Inquiry Team Experience as it Relates to the Problem Investigated

In this section, questions will ask about your Inquiry Team experience investigating the specific topic that was selected by the group.

Using the following scale, considering the specific problem you investigated, rate the extent to which you agree or disagree [illegible]	**Strongly disagree**	**Disagree**	**Undecided**	**Agree**	**Strongly Agree**
	1	2	3	4	5
55. 26 Encouraged me to conduct resea	○	○	○	○	○
56. 27 Encouraged me to share my knowledge with other educators	○	○	○	○	○
57. 28 Changed my thinking about the topic	○	○	○	○	○
58. 29 Caused me to apply new strategi	○	○	○	○	○
59. Helped me to feel more comforta	○	○	○	○	○

60.	Helped me to understand the cor	○	○	○	○	○
61. 30	Helped me to change my practice	○	○	○	○	○

Using the following scale, considering the specific problem you investigated, rate the	**Strongly disagree**	**Disagree**	**Undecided**	**Agree**	**Strongly Agree**
62. Reinforced my previous opinions	○	○	○	○	○
63. Helped me to feel more comforta	○	○	○	○	○
64. Made little impact on my educatic Topic	○	○	○	○	○
65. Encouraged me to share the infor Inquiry Team with persons outsic	○	○	○	○	○

SECTION 10 –The Value of the Inquiry Team Process

In this section, questions will ask about how much you valued each component of the Inquiry Team process.

Using the following scale, please indicate how valuable you found each listed aspect of the Inquiry Team process.	**Not Valuable**	**Somewhat Valuable**	**Undecided**	**Valuable**	**Very Valuable**
	1	2	3	4	5
66. Participating in the Inquiry Team in general.	○	○	○	○	○
67. Participating in the Inquiry Team meetings	○	○	○	○	○
68. Completing activities in between meetings	○	○	○	○	○
69. Brainstorming factors that influenced the probl	○	○	○	○	○
70. Considering my experiences relating to the prc	○	○	○	○	○

71. Gathering information about my colleague's e with the problem	○	○	○	○	○
72. Gathering information from educational resear	○	○	○	○	○
73. Gathering data from the school community (pa survey)	○	○	○	○	○

Using the following scale, pleas valuable you found each listed Inquiry Team process.	**Not Valuable**	**Somewhat Valuable**	**Undecided**	**Valuable**	**Very Valuable**
7 Analyzing information from all of the so research, school community)	○	○	○	○	○
7 Developing new strategies based on th information gathered	○	○	○	○	○
7 Considering how the strategies could be school	○	○	○	○	○
7 Presenting the information to our collea administration	○	○	○	○	○

SECTION 11 –The level of Difficulty of the Inquiry Team Process

In this section, questions will ask about your level of difficulty you experienced when engaging in various components of Inquiry Team experience.

Now considering these same items Use the following scale, please rate the lev of difficulty of participating in the components of the Inquiry Team process	**Very Difficult**	**Somewhat Difficult**	**Undecided**	**Somewhat Easy**	**Very Easy**
	1	2	3	4	5
7 Participating in the Inquiry Team in genera	○	○	○	○	○
7 Participating in the Inquiry Team meeting	○	○	○	○	○
8 Finding the time to meet	○	○	○	○	○

8 Having enough time to at each meeting to Tasks	○	○	○	○	○
8 Completing activities in between meetings	○	○	○	○	○
8 Brainstorming factors that influenced the p	○	○	○	○	○
8 Considering my experiences relating to the	○	○	○	○	○

Now considering these same items, Use the following scale, please rate the level of difficulty of participating i the components of the Inquiry Team process	**Very Difficult**	**Somewhat Difficult**	**Undecided**	**Somewhat Easy**	**Very Easy**
8 Gathering information about my colleague with the problem	○	○	○	○	○
8 Gathering information from educational re	○	○	○	○	○
8 Gathering data from the school community survey)	○	○	○	○	○
88. Analyzing information from all of the sources (research, school community)	○	○	○	○	○
89. Developing new strategies based on the analy information gathered	○	○	○	○	○
90. Considering how the strategies could be applie school	○	○	○	○	○
91. Presenting the information to our colleagues a Administration	○	○	○	○	○

- **Please provide any general comments that might be important for the understanding of your experience or important information you wish to impart.**

_____

_____

SECTION 12 –The Facilitator's Role

In this section, questions will ask about the role of the facilitator in your Inquiry Team experience.

Using the following scale, please rate the role of the Inquiry Team facilitator.	**Strongly Disagree**	**Disagree**	**Undecided**	**Agree**	**Strongly Agree**
	1	2	3	4	5
92. Encouraged collaboration with my colleagues i team	○	○	○	○	○
93. Provided guidance in selecting a topic to inves	○	○	○	○	○
94. Was available when needed	○	○	○	○	○
95. Challenged my thinking	○	○	○	○	○
96. Expanded my knowledge of reading research	○	○	○	○	○
97. Expanded my knowledge of how to access res	○	○	○	○	○
98. Expanded my knowledge of analyzing researc	○	○	○	○	○
99. Was prepared for Inquiry Team meetings	○	○	○	○	○
10(Was able to share information between the ac and the Inquiry Team members	○	○	○	○	○
1 Helped me to access the resources I needed	○	○	○	○	○
1 Was approachable	○	○	○	○	○
1 Established an environment that cultivated	○	○	○	○	○
1 Encouraged me to share my thinking	○	○	○	○	○

Using the following scale, please rate the role of the Inquiry Team facilitator	**Strongly Disagree**	**Disagree**	**Undecided**	**Agree**	**Strongly Agree**

1 Made the experience enjoyable	○	○	○	○	○
1 Was knowledgeable about utilizing research	○	○	○	○	○
1 Made me feel like a valued member of the t	○	○	○	○	○

- **If you would like, please include any comments you might have about the facilitator.**

_____

_____

_____

_____

SECTION 8 – Possible Interactions with the Inquiry Team (non-participants only)

In this section, questions will ask about any interactions you may have had with an Inquiry Team member during the course of the year.

Using the following scale, rate the extent to which you…	**Never**	**Sometimes**	**Often**	**Always**
	1	2	3	4
51. Discussed the Inquiry Team members' experience in the Inquiry Team process.	○	○	○	○
52. Discussed with the Inquiry Team member how to to research	○	○	○	○
53. Inquired about the information the Inquiry Team member had learned in the group	○	○	○	○
54. Asked specific questions about the topic of the team's inquiry	○	○	○	○
55. Apply any of the knowledge the Inquiry Team me gained in your practice	○	○	○	○
56. Used any information from the Inquiry Team to re problems in your daily practice	○	○	○	○
57. Used any information from the Inquiry Team to de new activities, programs, guidelines, and materials	○	○	○	○
58. Shared the information you had learned from an i team member(s) with another faculty member at t	○	○	○	○
59. Shared the information you had learned from an i team member(s) with persons outside of the scho	○	○	○	○
60. Have interest in participating in future Inquiry Tea opportunities	○	○	○	○

Appendix D: PreIntervention Interview Questions

PreIntervention Semi Structured Interview questions template with participants and non-participants:

1. What informs your thinking when you make instructional decisions?
    a. Of the sources you mentioned, which do you use the most or have the greatest influence on your thinking?
    b. Are there any resources you wish you had access to but currently do not?
2. Do you collaborate with your colleagues, why or why not?
    a. If so, how often?
    b. Who do you collaborate with?
3. Describe what those collaborations look like.
4. Do you find collaborating to be beneficial?
5. Does anything impede collaboration?
6. Describe any collaborations that have occurred with any professionals outside of the school.
    a. Were those collaborations positive?

Head of School Interview Question Template

1. What informs your thinking when you make educational decisions for the school?
    a. Of those sources, which do you use the most or have the greatest influence on your thinking?
    b. Are there any resources you wish you had access to but currently do not?
2. When faced with potentially numerous problems to solve or decisions to make, how do you decide what to address first?
3. Once you have decided to make a change or have information you feel is important to share, how do you go about informing the faculty or your other colleagues?
4. Do you collaborate with anyone else when making decisions? Why or why not?
    a. If so, how often?
    b. Who do you collaborate with?
5. Describe any collaborations that have occurred with any professionals outside of the school.
    a. Were those collaborations positive?

Appendix F: Sample Interview Questions

1. Can you talk a little bit about interacting with research, how was that experience for you? (valuable, easy to access, felt you had enough knowledge to engage, comfortability?)
2. Do you think the IT experience reinforced your thinking or changed your thinking about the topic, or both? Or was you thinking impacted in some other way?
3. When considering how educational decisions have been made at our school in the past, do you think there is any value in going through the IT process?
4. Do you think we would've arrived at the same result in regards to the report card format if we did not go through the IT process?
5. Now that you have been through this IT experience, do you think it is a professional learning format that should be utilized in the future? If so, in what ways and if not- why?
6. How did you think the presentation to your colleagues and the administration went? Did you get any feedback afterward?
7. Are there any alterations to the IT process that you would suggest?

Specific Question for Participant A

1. You were interested in the topic of grades when entering the process. Did the Inquiry Team experience have any impact on your thinking about the topic of grades?

Specific Question for Participant B

1 In your previous interview, you mentioned not having too many opportunities to collaborate with colleagues outside of your grade level team. During the IT process you did have an opportunity to collaborate with teachers outside of your grade level, what did you think if that collaborative experience?

Appendix G: Focus Group Questions

Please discuss the following prompts/questions as a group. Have one member create a written record of the discussion without including information about who has contributed what reflections.

Following the discussion, the written record should be briefly reviewed to ensure participants agree it captures the information accurately.

This anonymous record will be given to the student investigator.

During discussion, please allow all those who would like to share their reflections to do so. If individuals would like to provide additional written documentation of their thoughts beyond that provided in the written record that is welcomed.

It is appropriate to move on to the next question when no new information seems to be generated or when concerns about time indicate that moving to the next question is necessary.

1. What worked? Describe what components or experiences of the Inquiry Team activities should be used by other teams in the future.

2. What didn't work? Provide some suggestions that describe how the Inquiry Team experience can be improved. Where appropriate, please identify what problem the suggestion might help to address.

3. Provide some suggestions for how to improve the role of the Inquiry Team facilitator.

4. Provide some feedback for aspects of the facilitator activities or approaches that worked well.

Appendix H: Knowledge Broker Activity Log

Date	Activity	Hours	Minutes
1/3	Examining online resources to help teachers read research	1	15
1/13	Looking for resources and information about facilitation	2	45
1/14	Creation of the powerpoint presentation for the first meeting, watched videos relating to facilitation,	2	30
1/20	Creating documents and finding resources	2	
1/30	Meeting with Head of School		45
2/2	Placing resources on the group space		20
2/4	Sending email, organizing notes and resources, making fishbone diagram	3	30
2/5	Making and Finding resources for making surveys	1	
2/12	Copying resources, power point, writing up plan for meeting	1	30
3/5	Working on cleaning up parent survey (asked the help of two IT members) and then emailed it out to all for feedback	2	
3/5-3/9	Correspondence about parent survey with head of school and Inquiry Team members and continue to update document with feedback		30
3/13	Gathering articles for research talk, making copies, hole punch, planning lesson	1	30
3/15	Organizing format for the teacher survey	1	
3/15-3/16	Correspondence and updates to survey		20
3/19	Further edits of survey, transition into survey monkey	3	
3/19	Discussion with head of school about survey and her concerns/feedback		21

3/20	Final edits of survey and email to faculty	1	
4/1	Email to Inquiry Team about progress and new survey question idea		20
4/5	Update of parent survey and conversion into survey monkey	1	30
4/7	Email to Inquiry Team about the agenda for the next meeting		15
4/9	Made copies and emailed copy of teacher survey results to team members, emailed head of school about parent survey updates and distribution		30
4/9	Preparation for next meeting by reading resources about facilitating deep conversation and facilitating data analysis	2	
5/	Email recapping info from last meeting		30
5/17	Tracking down a book at library for narrative report cards (not on shelf)		20
5/20	Conducting research on narrative report cards		45
5/26	Working on report card template and my section of presentation. Also, sent an email to team with links to the two documents. Called an Inquiry Team member to talk through the report card format.	5	30

Curriculum Vitae

Jennifer Asmonga
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RESEARCH INTERESTS
Knowledge mobilization, collaborative inquiry, practitioner's use of education research, multi-level boundary crossing, knowledge brokering, educator professionalism and empowerment

EDUCATION
School of Education Doctoral Degree in Education Leadership
Johns Hopkins University
Specialization: Mind, Brain, and Teaching

Masters of Education, April 2011
University of Pittsburgh, Pittsburgh, PA
Major: Social and Comparative Analysis in Education

Bachelor of Education, May 2005
Clarion University of Pennsylvania, Clarion, Pa
Majors: Special Education and Elementary Education

PROFESSIONAL EXPERIENCE
Head of School, Shady Side Academy, July 2018-Present
Learning Specialist, Shady Side Academy, August 2012- June 2018
Fifth Grade Teacher, Shady Side Academy, August 2011-June 2012
Kindergarten Long-term substitute, Shady Side Academy, November 2010-March 2011
Special Education Teacher Grades 5-7, Propel Montour Charter School, August 2007-June 2009
Fifth Grade Teacher, Urban League Charter School, August 2006- June 2007

CONFERENCE PRESENTATIONS
Mindfulness Practice for the Classroom *2018*
STAR Center Conference, Pittsburgh, PA
Stress Management Toolbox *2014*
PAEYC & Allegheny County Family Support Conference: Inviting Ideas Inspiring Innovation. Pittsburgh, PA
Exercise and the Brain *2014*
Pennsylvania State Association for Health, Physical Education, Recreation and Dance. Seven Springs, PA

PUBLICATIONS
Asmonga, Jennifer. "The Space Between: Using Inquiry Teams to Encourage Multilevel Boundary Crossing Between Educational Research and Practice." Dissertation.